Nature Magazine

VOLUME 46 NUMBER 6

JUNE-JULY, 1953

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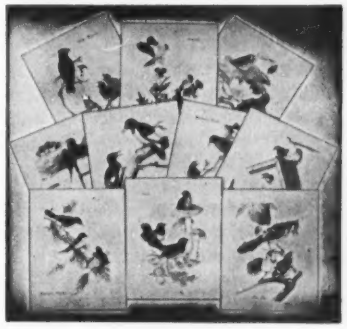

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Nature in Print

By HOWARD ZAHNISER

MY ten-year-old tree student, Karen, and I have been reading together Margaret Cosgrove's *Wonders of the Tree World* and have found ourselves not only enjoying this volume, designed to "intrigue children into observing more closely and exploring with zest and imagination the unique possessions and mechanisms of the various trees," but also appreciating a number of other recently published "tree books" that have found their way to my review shelf.

One of these, William Carey Grimm's *The Trees of Pennsylvania*, has been especially interesting to us because of our ties to Tionesta, in Pennsylvania's Forest County, where we enjoy spending as much vacation at "Grandma's" as we can. For many years Dr. Joseph S. Illick's *Pennsylvania Trees* has, in fact, been our most common resort in our home library when a tree identification has been sought, because its drawings have always proved to be helpful illustrations and its text comments have been clear and interesting. Mr. Grimm's pages are larger, his many drawings similarly illustrative, and his text both similarly interesting and appropriately up to date. He has consulted Dr. Illick's book extensively, Mr. Grimm tells us, and, it seems to us, has provided a welcome successor to this earlier Pennsylvania classic, which is of course now long out of print. The new book lacks photographs (or drawings) of the entire tree, of forests, or of the tree in the landscape, but its drawings of branches, buds, leaves, fruits, seeds, and so forth are large, and clear, and easy to use.

Along with Mr. Grimm's tree book we also now have his later published (1952) companon volume on *The Shrubs of Pennsylvania*. Generally speaking, Mr. Grimm defines a shrub as "a woody plant which is smaller in stature than a tree and with several stems growing together in a clump," but he confesses that it is hard to draw a sharp line between shrub and tree. "Several of the species included in the present book," we read in its preface, "were also included in the author's work on *The Trees of Pennsylvania*, for they may be regarded both as trees and as shrubs." The drawings, we are told in the preface, have been made by the author, either from fresh material or from herbarium specimens, and "an effort has been made to illustrate and describe the salient characteristics of each species most useful in both its summer and winter identification."

In Pennsylvania, and only slightly to less extent in neighboring States and in the northeastern region, these volumes by William Carey Grimm can serve well in the home for identification and for brief information. Numerous drawings in introductory pages, outlines of characteristics of leaves and flowers and fruits, and such accounts as that on "How Trees Grow" give considerable information about trees.

In this connection, Margaret Cosgrove's *Wonders of the Tree World* is of particular interest, especially, of course, to children, but also to all of us who yet have tree wonders to learn. "Roots Are Important," reads the title of one short section. "A Tree Has a Heart, Too," reads another title. And a third informs us "A Leaf Is a Factory."

Thus the book proceeds through its wonders, including descriptions of particular tree families and individual species, and illustrations for all its pages. Concluding with an account of the fictitious "Money Tree," Miss Cosgrove assures her readers that "anyone who owns most of the things in the world" will tell that "he's not happy with them."

"But," Miss Cosgrove goes on to the end of her volume, "ask anyone who *IS* happy just *WHY* he is, and he'll tell you he has a secret way. It's this: *he's very interested in something*, or in lots of things. . . . And a lot of people get a lot of happiness out of looking at trees everywhere they go, and thinking about how they grow, and learning their names. Knowledge of trees would be useful to them, too, if they should ever get lost in the woods. And it doesn't cost them a penny!"

Many adults are, indeed, lost in any woods simply for the lack in their childhood of such a beginner's book as this *Wonders of the Tree World*, or its equivalent, and most of us can well profit from an improved knowledge and understanding of trees. Ferdinand C. Lane's *The Story of Trees* is thus a welcome book of knowledge and lore to put on the shelf beside the books of identification—a book to refer to and one to read.

From the poets and other great writers Dr. Lane has taken quotations for grace notes at the beginnings of his 89 chapters. For the chapter on "The Holocaust of Flame" there is a quotation from Seneca: "A forest is long in growing but its ashes are made in a moment." The chapter on "Wood, the Coming Raw Material" carries William Cullen Bryant's:

> My heart is awed within me
> when I think
> Of the great miracle that
> still goes on
> In silence round me. . . .

Thoreau's testimony, "I went to the woods because I wished to live deliberately, to front only the essential facts of life, and see if I could not learn what it had to teach," is quoted at the beginning of a chapter on "Federal, State and Communal Forests."

It is good to see such a chapter in this volume, with its tributes to Thoreau and Muir and others and its recognition of a value in preserving natural areas, although the discussion itself is indeed inadequate in describing our preservation programs and practices, and also in accounting for them historically. In fact, only a partial understanding of this aspect of conservation is implied, for example, in explaining objections to airplanes in the Quetico-Superior canoe country by saying that "since we prize antiques and crumbling ruins, a remote bit of unspoiled wilderness as it once flourished before the white man came may well possess a similar sentimental value." There are deeper and wider values and more extensive accomplishments than are explained in this chapter.

But Dr. Lane's book is of its greatest interest because it touches, in a broad and "popular" way, on so many aspects of trees, from the classification of trees to their "Religious Associations." Enriched out of Dr. Lane's boundless interest and from his wide reading, it is, as its publishers say on its jacket, "a lively, combination of 'believe-it-or-nots' and ancient myth, historical anecdotes, and lucid scientific explanations." Its assembly of good photographs is most welcome, and the twenty "Chips of Information from Living Trees" that make up an Appendix are intriguing.

High Valley

By BESSIE BERG

Low hills half ring my mountain valley home;
Night's sudden shadows fall from high sierra's crest.
Eastward, dim, misty distance stretches on
Into mauve twilight, on the desert's breast.

Here, through the gateway to the sun
Her morning rays pour on the golden hills;
Those flanking portals where the sunset spills
Her rose and purple when the day is done.

There, on some ridge below the snowy crest
The free, wild stallion leads his band, and stays
To breathe the heady fragrance of the sage
And greasewood, swept by winds that sink to rest.

This valley lies within the palm of God;
The spirit reaches up to touch the stars
That pierce the high, blue depth of night,
So close, we glimpse, that Heaven has no bars!

"The most valuable tree," says Chip No. 5, "is the Coconut Palm." "The most beautiful tree," says No. 20, "is—a matter of opinion."

It probably also is "a matter of opinion" as to what the "best" tree guide book is, but the last of these volumes that Karen and I have been handling would certainly get our vote for a book that can be carried with us in the car (or hand) and used to identify trees, but also to satisfy some of our curiosity about them. This book is Rutherford Platt's *American Trees: A Book of Discovery*. It covers the country. It is illustrated with many drawings (by the same Margaret L. Cosgrove who has now also written and illustrated *Wonders of the Tree World*) and contains also many photographs, a number in color. It is written with a constant sense of revelation. To read it through, as I found myself doing when I first looked at it, or to use it as a handbook, is to have indeed a feeling of discovery and, with Rutherford Platt, an appreciation for the glory and wonder and reality of trees. It may sound strange to say that reading or using this handbook is an esthetic experience, but surely the following quotation of its list of contents will be convincing. In the first place, instead of being entitled "Contents", it is called, the list of contents, "The Seven Regions of Discovery." And it is presented thus:

Page

1. THE GREAT AMERICAN WOODS comprises trees east of the Rocky Mountains. They are the neighborhood trees that everybody ought to know 9
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   - The Understory Trees 63
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3. THE SOUTH is contained in the Great American Woods with many of its own characteristic trees 117

4. SOUTHERN FLORIDA is a unique little region of subtropical trees 141

5. THE NORTHWEST is the greatest forest region of our country ... 149

6. CALIFORNIA has trees found nowhere else in the world, and also has many unique and beautiful trees from many parts of the world 199

7. THE SOUTHWEST has unusual and fantastic trees of arid places . 225
   The trees of each of these regions are wonderfully different. This is one of the glories of our country.

Rutherford Platt's "foreword" is entitled "Something Marvelous Is Going On Here!"

"Take any tree," our author advises. "Hang a sign on it announcing '*Something marvelous is going on here!*' Everybody who has the least sense of wonder," he predicts, "will stop to find out what is going on."

"Such a sign," Rutherford Platt assures us, "does hang on every tree—addressed to all the senses of sight, hearing, smell, taste, and touch." And fortunate are those who have at hand his *American Trees: A Book of Discovery* for its revelation and its translation of the signs.

(Fortunate also are those who have a young Karen to share an interest in trees and enliven or revive the sense of wonder they do inspire!)

American Trees: A Book of Discovery. By Rutherford Platt. New York: Dodd, Mead & Co. 1952. 256 pp. (4¾ by 7⅝ in.), with 384 text drawings by Margaret L. Cosgrove, 21 photographs in color by the author on 8 plates, 46 photographs in black and white by the author on 32 plates, and index. $3.50. (Also available in paper covers for 35 cents is *A Pocket Guide to the Trees: How to Identify and Enjoy Them*. published by Pocket Books, Inc., New York, No. C-93.)

The Story of Trees. By Ferdinand C. Lane. Garden City, N.Y.: Doubleday & Co. 1952. 384 pp. (6 by 9¼ in.), with 36 photographs on 16 plates, 2 text maps showing virgin forest areas, and index. $5.

The Shrubs of Pennsylvania. Text and illustrations by William Carey Grimm. Harrisburg, Pa.: The Stackpole Co. 1952. xvii + 522 pp. (7¾ by 10¾ in.), with frontispiece photograph, numerous drawings of leaves, fruits, buds, etc., and illustrations of the leaves and fruits of 203 "shrubs," glossary, bibliography, and index. $5.

The Trees of Pennsylvania. Text and illustrations by William Carey Grimm. Harrisburg, Pa.: Stackpole and Heck. 1950. xiii + 363 pp. (7¾ by 10¾ in.) with frontispiece photograph, 98 drawings of leaves, flowers, buds, etc. and drawings of the leaves, fruits, etc. of 129 trees, glossary, bibliography, and index. $5.

Wonders of the Tree World. Text and drawings by Margaret Cosgrove. New York: Dodd, Mead & Co. 1953. 92 pp. (6¾ by 9¼ in.), with 186 drawings and index. $2.50.

Wisconsin Wilderness

In order to protect the scenic assets and wildlife in a substantial area of Vilas and Florence counties, Wisconsin, property owners have joined to form the Three Lakes Wilderness Society, which embraces most of the property in Three Lakes Township. Fred (Cy) Williams of baseball fame has been elected president of the organization. In order to present their conservation views the group publishes *The Wilderness News*, of which Walter Goldsworthy of Three Lakes is editor.

ALAN DEVOE

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our animal neighbors

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illustrated by
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To Stimulate Public Interest in Every Phase of Nature and the Out-Of-Doors, and Devoted to the Practical Conservation of the Great Natural Resources of America

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Bulletins Received

"A Test to Measure Observation and Understanding of Physical Phenomena and Life Processes," by Annette M. Wright and Hugh B. Wood, and "Plastic Mounts for Science Specimens," by Hiram M. Hunt, being Curriculum Bulletins Nos. 102 and 113 of the School of Education, University of Oregon, Eugene, Oregon. Twenty-five cents each. . ."The Truth about Water Fluoridation" by Charles Eliot Perkins, from the Fluoridation Educational Society, P.O. Box 8036 Southwest Station, Washington 24, D.C. One dollar. . ."Yale Conservation Studies," Vol. 2, 1953, is published by the Yale Conservation Club, 77 Prospect St., New Haven, Conn., as an activity of the graduate students of the Conservation Program. One dollar. . ."Collecting Bumble Bees" by T. B. Poole, published by The Amateur Entomologists' Society, One West Ham Lane, London, E.15, England, for forty cents. . ."Thousands of Science Projects" is published by Science Clubs of America, 1719 N. St., N.W., Washington 6, D.C., for twenty-five cents.

Ontario Camp

Notice reached us very late about the fifteenth season of the Nature Study Camp operated by the Federation of Ontario Naturalists on Bella Lake in the Muskoka Lake country. This camp has proved itself to be an outstanding experience and opportunity for youth group leaders, camp counsellors, teachers and individuals interested in Nature. This year's session starts June 27 and runs to July 11. Registration closes June 19. The address is 187 Highbourne Road, Toronto 12, Ontario, Canada.

School Outdoors

The Outdoor Schoolroom for Outdoor Living. By William Gould Vinal. Vinehall, RFD, Cohasset, Mass. 1952. Published by the Author. 69 pages. $1.00.

The well established style of "Cap'n Bill" characterizes Dr. Vinal's latest publication in the field of outdoor education. Beginning with a philosophical discussion of the place of outdoor living in the educational processes, Dr. Vinal leads through the approach of questioning to the inevitable conclusion that public education for the outdoors is a necessity, supported by his own "ten points" of argument based on values to the individual, to the community, and to the national welfare.

Thirty important concepts applying to outdoor schoolrooms and conservation education are established, followed by stimulating discussions of wildlife sanctuaries, outdoor theatres, school project activities, and the outdoor education responsibilities of all concerned in the educational process, from the Superintendent of Schools to the individual student. Considerable space in the project activities section is devoted to trips based on Orienteering, or cross-country techniques, through which a broad variety of "down to earth" experiences for the student may be created.

The final item is a "Neighborhood Primer," which outlines the approaches to a community study, leading into a cooperative program between the school and the responsible public authorities for restoration and rehabilitation of a decadent park in Newton, Massachusetts. This case history, developed by Dr. Vinal for his conservation education workshops, offers many suggestions of wide application.

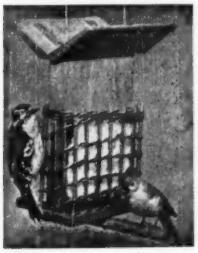
As an over-all appraisal, this book lacks somewhat in cohesiveness, but this is in major degree compensated by the challenges, the stimulus to thinking, the concrete suggestions, and the guide outlines for activity programs which are presented in it. H. Raymond Gregg.

Derrybrook

Derrybrook is described as "A Training Center for Outdoor Living." Its summer address is Derrybrook, South Londonderry, Vermont. Established in 1949, it offers camping for adults, 18 years and up, a camp counsellor course, courses in outdoor leadership, group weekends for leaders, camping for girls from 13 up and other opportunities. Write to Miss Catherine Hammett at the address given for full details.

Resource Conference

Following meetings of groups of sponsors, the Mid-Century Conference on Resources for the Future has chosen the dates of December 2 to 4, 1953, for the postponed conference on natural resources. Lewis W. Douglas, chairman of the board of the Mutual Life Insurance Company of New York, has been named as chairman of the conference. The organization sponsoring the meeting is financed by funds from the Ford Foundation and is known as Resources for the Future, Inc. Its headquarters are 706 Cafritz Building, 1625 Eye Street, N.W., Washington 6, D.C.



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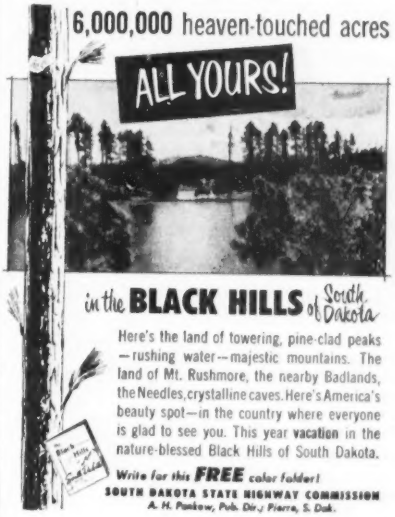
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Briefly Noted

The Atom Story. By J. G. Feinberg. New York. 1953. The Philosophical Library. 243 pages. $4.75.

A book on the atom for the layman.

Bucks and Bows. By Walter Perry. Harrisburg, Pa. 1953. The Stackpole Company. 223 pages. $4.95.

A discussion of bow hunting and the appurtenances thereto.

Robins in the Garden. By Olive L. Earle. New York. 1953. William Morrow and Co. 64 pages. Illustrated by the author. $2.00.

A Morrow Junior Book for the quite young reader.

What's inside of Animals? By Herbert S. Zim. New York. 1953. William Morrow and Co. 32 pages with end pictures. Illustrated by Herschel Wartik. $1.75.

This is a simple introduction, a sort of first book on zoology, for the youngster who wants to know what *is* inside animals.

The Composition and Assaying of Minerals. By John Stewart-Remmington and Wilfred Francis. New York. 1953. The Philosophical Library. 128 pages. $5.50.

The chemical composition of minerals and a guide to their qualitative and quantitative examination.

What Is Science? By Norman Campbell. New York. 1953. Dover Publications. 186 pages. $1.25, paperbound; $2.50, clothbound.

Introduction to the nature of scientific thought by an eminent scientist.

Flatland. By Edwin A. Abbott. New York. 1953. Dover Publications. 103 pages. $1.00, paperbound; $2.25 clothbound.

A sixth and revised edition of this popular treatment of a four-dimensional world.

Waves and Tides. By R. C. Russell and D. H. Macmillan. New York. 1953. The Philosophical Library. 348 pages. $6.00.

A somewhat scientific discussion of the activities of the waves and tides.

From Lodestone to Gyro-Compass. By Captain H. L. Hitchins and Commander W. E. May. New York. 1953. The Philosophical Library. 220 pages. $4.75.

Two officers of the Royal Navy discuss compasses of all kinds in relatively popular terms.

Enchanted Island. By Walter Lowrie. New York. 1953. Philosophical Library. 200 pages. $3.00.

The charms of life on the Island of Ischia in the Bay of Naples.

The Stars Are Yours. By James Sayre Pickering. New York. 1953. Macmillan. 298 pages. Illustrated. $3.95.

A new edition of this astronomy book, revised to include new discoveries, and with a new section on star names and locations of the planets.

Geometry and the Imagination. By D. Hilbert and S. Cohn-Vossen. New York. 1953. Chelsea Publishing Co. 357 pages. $5.00.

Geometry presented as it stands today in its visual, intuitive aspects.

The Sportsman's Outdoor Guide. By Charles B. Roth. New York. 1953. Prentice-Hall. 170 pages. Illustrated. $3.95.

How to handle yourself in the outdoors as hiker, camper, climber, fisherman or gunner.

Danger Signals. By Walter C. Alvarez. Chicago. 1953. Wilcox and Follett Co.176 pages. $3.00.

Popular discussion of some of the physical warnings given human beings by the human body.

American Planning and Civic Annual, Edited by Harlean James. Washington. D.C. 1952. American Planning and Civic Association. 142 pages. $2.00.

A record of recent civic advance in the fields of planning, parks, housing, neighborhood improvement and conservation of natural resources.

New Pathways to Piano Technique. By Luigi Bonpensiere. New York. 1953. Philosophical Library. 128 pages. $4.75.

A study of the relations between mind and body with special reference to piano playing.

Spadework. By Sir Leonard Woolley. New York. 1953. Philosophical Library. 124 pages. Illustrated. $4.75.

A collection of reminiscenses of a noted archaeologist.

The Scientific Adventure. By Herbert Dingle. New York. 1953. Philosophical Library. 372 pages. $6.00.

A collection of essays on science by the Professor of History and Philosophy of Science at University College, London.

The Suez Canal in World Affairs. By Hugh J. Schonfield. New York. 1953. Philosophical Library. 174 pages. Illustrated. $4.50.

The story of the Suez Canal, past and present, and its historic and political significance.

Encyclopedia of Aberrations. Edited by Edward Podolsky. New York. 1953. Philosophical Library. 550 pages. $10.00.

Definition of aberrations found in humans, from Abasia to Zoosadism, proving man to be a complicated mechanism.

Films

Fine popular reception and sustained interest moved RKO Radio Pictures, distributors of Walt Disney's splendid True Life Adventure films, to make the first two releases in this series available in 16mm sound. Thus "Beaver Valley" and "Nature's Half Acre" can be rented for ten dollars a day from RKO Radio Pictures, 1270 Avenue of the Americas, New York 20, N.Y. . .Ideal Pictures Corporation, 65 E. South Water Street, Chicago 1, Illinois, announces the availability of fifteen free loan sports films sponsored by Evinrude Motors, Milwaukee, Wisconsin. These are mostly fishing and boating films, all of them in color and varying in length from 13 minutes to 45 minutes. . .The Jam Handy Organization, 2821 East Grand Boulevard, Detroit 11, Michigan, announces its up-to-date catalog of filmstrips entitled "Class Tested Filmstrips." This listing is free on request to the School Service Department of Jam Handy.

Gadgets

Waltco Products, 2300 W. 49th St., Chicago 9, Illinois, announces its All-in-One Pik Nicker with four each of knives, forks, spoons, mugs, luncheon plates, plus food-tainers, vacuum bottle and carrying case. Lists for $11.95. . .Interstate Bedding Company, 1621 W. Carroll Avenue, Chicago 12, Illinois, has two new tent and sleeping bag combinations, the Arktik Jetent Combination and the Artik Airlite Combination, and will send details and prices. . .Nappe-Smith Manufacturing Company of Farmingdale, N.J., produces Thermo-Keepo insulated plastic bags in varied sizes that are boons to campers and picnickers. . .Gard Industries, Inc., Wilmette, Illinois, announces GARD, a weatherproof spray for all kinds of sports equipment. They send a picture of a golf shoe floating in an aquarium, where it is said to have remained afloat for eleven months. . .Triplett Bros., Inc., 139 East South St., York, Pa., are proud of a rod guide, a device that holds the rod and reel in the proper position on the bank of a stream or along the side of a boat. Costs a dollar. . .Oswego Soy Products Corp., Oswego, N.Y., has introduced a new plant food and soil conditioner called Feralon . . .Many will find nostalgia in a game called "Grand Slam," which is nothing more than good old "Shinny," and for which Grand Slam, Box 43, San Gabriel, California, makes a puck or peg, and a paddle, and sells the set for two dollars . . .Cortland Line Company, Cortland, N.Y., boasts of its Non-Sinkable Fly Line, which has created such a stir that the output is gone for this season. . .Panef Manufacturing Company of Milwaukee, Wisconsin, announces a completely new casting rod and pole holder with a thumbscrew control to adjust the cradle holding the reel to every angle and elevation.

The Devoes

Our Animal Neighbors. By Alan Devoe, with Mary Berry Devoe. New York. 1953. McGraw-Hill Book Company. 278 pages. Illustrated by Walter Ferguson. $3.75.

It is possible to explore Nature in the large by travel to far parts of the world, or through books, the zoo and the museum. But the Devoes find fully as much pleasure in exploring Nature in the small by achieving intimate acquaintance with the wild friends that are co-dwellers on the 125 acres of Devoe property in the western Berkshires. This book is ample proof that enough that is fascinating and challenging lies very close about one who is so fortunately situated as these writers on Nature subjects. Of course, the story of these wild neighbors is told with all the Devoe charm and understanding of wildlife, making this book one to treasure for the joy of its reading as well as for its content and the information in it.

Contents Noted

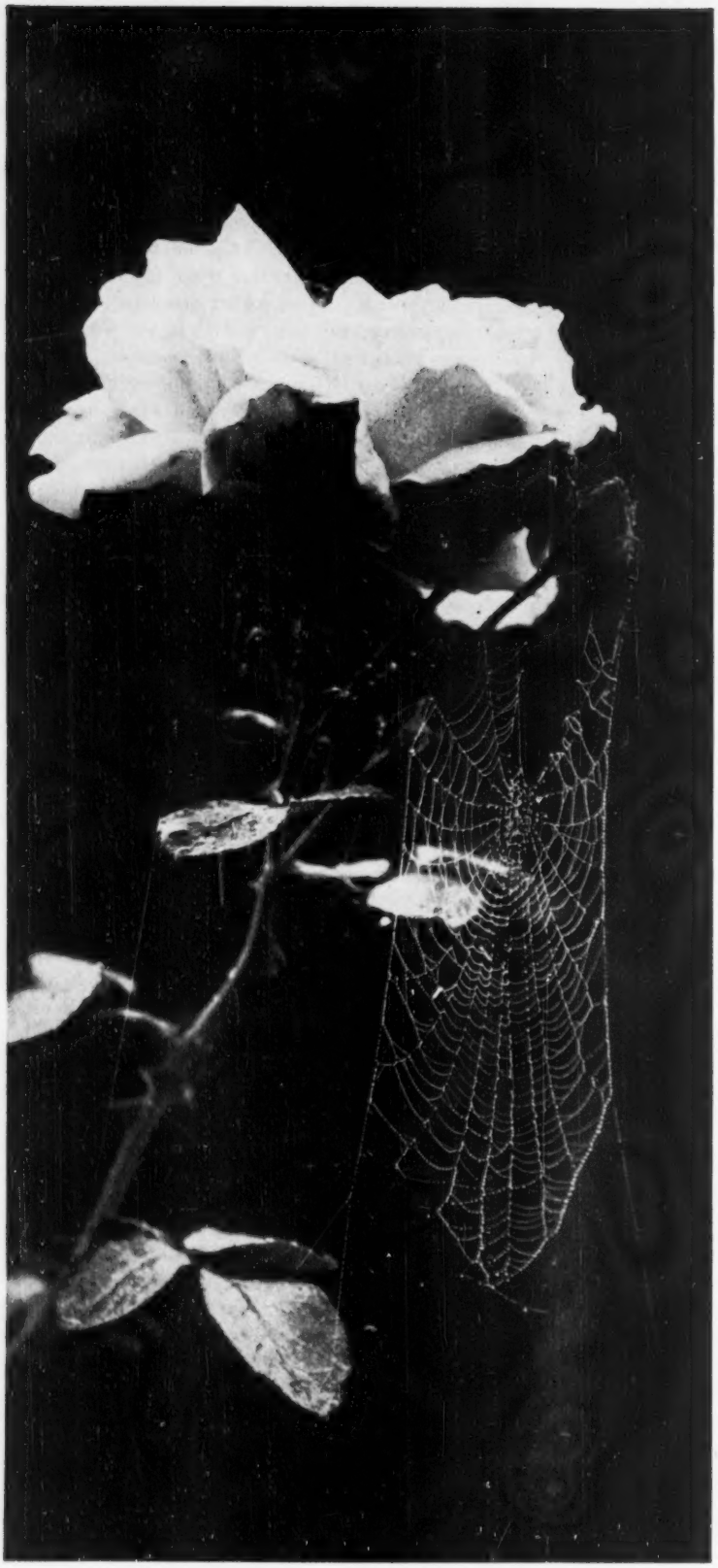
TRADITION, it appears, must be served, and certainly the Coronation of Queen Elizabeth is no exception. In order that the Royal Guards may be properly arrayed for the event, three thousand shakos, those unbelievable headpieces, have to be provided. For these the skins of three hundred black bears are necessary. To secure this supply Associated Guides of Vancouver, British Columbia, were commissioned to get the hides. L. D. Taylor, a member of the Hungry Hunters' Club of Dunsmuir, California, was in on the hunt. He reported that it was not a "hungry hunt" but a massacre, because "there were just too many bears up there to make it sporting." His group of six killed seventeen bears in two days—for tradition.

BY MID-APRIL the last of the pitiful remnant of whooping cranes had left the Aransas National Wildlife Refuge in Texas for their nesting grounds in Northwest Territory, Canada. This little band added up to just twenty-one birds, with the exception of two crippled birds in the Audubon Park Zoo in New Orleans, all that remain of North America's largest migratory bird. In their southward flight last fall two of the birds fell to gunfire, one in Saskatechewan and the other in Kansas, despite the fact that they are fully protected by Federal law and are unmistakeable in flight. The white body of the crane, with the black wing tips, make the bird easy to discern and, also, an easy target. And its blaring, hornlike "whoop" can be heard for some distance. The U.S. Fish and Wildlife Service pleads for complete cooperation to see that the birds are given every chance for survival.

ANOTHER bird on the brink of disaster is the California condor, recently the subject of controversy in relation to an attempt to capture a breeding pair of the birds and transfer them to the San Diego Zoo. Unsuccessful in an attempt to trap a pair, Lewis Wayne Walker, California naturalist, abandoned the project when the condors were about to hatch their eggs. In doing so, he issued a most interesting and objective comment on the project, which had as its object to assure perpetuation of the birds by breeding them in the San Diego Zoo's flying cage, the largest of its kind in the world. Mr. Walker asserts that no more ideal place could be provided in captivity for the birds, nor greater likelihood of success offered. Andean condors have successfully reared families there, and, under protection and with such excellent habitat, have stepped up the egg-laying cycle when young birds were taken and reared by hand. Mr. Walker asserts that the California condors are being given privacy and protection, but, at the same time, starvation because mountain lions in the condor refuge area have been killed off and thus the birds are deprived of the natural food of partly consumed carcasses left by the lions. He makes a strong case to show the effect of lack of food on the numbers of the birds, and cites evidence of an increased death rate among the young birds. It is his conviction that the condors could be safely and successfully raised in captivity and freed on such California coastal islands as Guadalupe, with its goats, or Socorro, with its sheep, have adequate food and certain protection, and be preserved as a native species. As to the claim that they will not nest in captivity, he points out that the three spinster condors in the National Zoo in Washington, D.C., laid about two dozen eggs during their captivity and tried, futilely, of course, to incubate them. In an earlier comment on the condor controversy, we observed that we would prefer seeing the birds free in their native haunt than in captivity. However, if it can be demonstrated, as Mr. Walker seems to prove, that the birds are indeed doomed if things go on as at present, then the San Diego plan would seem to have great merit. It is to be hoped that ornithologists will come to some agreement—if such is possible—before it is too late.

IT IS interesting that the concern for these two endangered species of great birds should be reduced to quite simple terms in a news story and picture that has been widely printed in the press from its point of origin in St. Louis. Many people will recall the recent report of the mother robin who built her nest and laid her eggs on wooden shoring used in connection with work on a building being added to St. Agnes Home for the Aged in suburban Kirkwood. The going and coming workmen and all the hurly-burly of construction bothered the nesting mother not at all. Then there came a time when the shoring around a concrete pouring needed to be knocked off. The mother was still on the nest. There was a conference, and it was decided to transfer workmen to another part of the job while the mother was given a chance to hatch her young and get them launched in the world. We liked the observation of the head of the contracting firm, J. E. Vollmar, Jr., when he was asked about his interest in birds. "No," he said, "I'm not a bird lover. I just respect a fellow contractor."

IN OUR April issue we published an article entitled "The Chlorophyll Craze." It was signed by one "Bryan Houston." This is a pen name of the author, who is a university professor of botany, and whose university, for some inscrutable reason, frowns on the writing of popular articles by members of its faculty, hence the pseudonym, which, incidentally, was chosen by the author's wife. The article was critical of extravagant claims made for this substance, including its use in toothpaste. A few days ago we received a visitor, a most genial gentleman who is with the New York advertising firm of Sherman and Marquette. Our caller has, as an important client, Colgate toothpaste, and his name is Bryan Houston—believe it or not. R.W.W.



★

The Cobweb and The Rose

By NORMAN EDSON

I grew the rose,
And so could you.
The cobweb,
Was something I
Could never do.

Created in a night,
Bejeweled with dew,
The spider
Had the art
No gardener knew.

★

Mountain Ablaze

By ROBERT MARSHALL

With a foreword

By A. A. BROWN

Chief, Division of Forest Fire Research, U.S. Forest Service

TO ONE of those few dozen collegian recruits who were initiated into the work of the Forest Service in the early 20's, in the "Inland Empire," Bob Marshall's letters on fire-fighting bring back vivid memories. Only a few changes in places and names and they might well have been our own. Bob's letters have a special value because he was keenly perceptive of men, of environment, and of the overpowering challenge of fire.

The many thousand square miles of mountains and forest of which he speaks are a sizable part of the United States, but the men protecting it, whose lives it shapes, are only a small group. The losses, the expenditures and other statistical facts of that period have been recorded previously. The human aspects have not, to any similar extent.

To a modern fire-fighter in that country, a reading of Bob's letters might at first leave the impression that his observations are no longer of much significance, that great changes have occurred and that many of the experiences he related will not again be repeated. But the only changes are man-made. Nature still holds its sway in our great back country of the West. The same environment is there, the same lightning storms, and the same potential for great, destructive fires.

The changes that seem so hopeful to the veteran fire-fighter are the smoke-jumpers, aerial detection of fires, more roads, better communication, and somewhat better equipment and facilities than existed in the 1920's. But there are only enough smoke-jumpers for an average situation. Even more important, after the smoke-jumper lands, he fights fire just as in the 20's with hand tools and crude woodsmen's methods.

Then, too, the drought years of the period of Bob's observations have not been repeated in the past ten years, the dollar has been inflated faster than the gains in appropriations for such work, and the number of skilled men is fewer. Even more serious, the technical aspects of the fire-fighting job have not been financed in step with the action program. So the ac-

tive, aggressive research and innovation program that made its brave start in the 20's has languished.

A return of serious drought conditions, or a peak concentration of dry lightning fires, or even a few fires starting in the increasing expanses of dry logging slash at the wrong time and places, may, in any year, repeat the heartbreaking trials of men pitted against unreasonable odds.

★

Robert Marshall (1901-1939) was a forester, leading advocate of wilderness preservation, explorer, writer and humanitarian. He became Director of Forestry of the Office of Indian Affairs and the first Chief of the Division of Recreation and Lands of the U.S. Forest Service. This article has been composed from letters written by Robert Marshall to his family while he was a Junior Forester and Assistant Silviculturist with the Northern Rocky Mountain Forest Experiment Station of the U.S. Forest Service, 1925-1928.

★

Forest Experiment Station,
Priest River, Idaho.
July 14, 1925.

On Sunday morning, the Kaniksu National Forest, in which the Experiment Station is located, was struck by the worst lightning storm in its 25-year history. . . .

Watson Mountain Fire,
Kaniksu National Forest,
July 19, 1925.

The staff of the Experiment Station has laid aside research and come here to act as fire officers. I'm working 18 to 20 hours a day as time-keeper, Chief of Commissary, Camp Boss, and Inspector on the fire line.

Pierce City, Idaho.
August 23, 1925.

The Watson Mountain Fire started about 4 A.M., Sunday, July 12th, from the dry lightning storm that kindled 61 blazes on the Kaniksu and killed the lookout on South Baldy. Watson Mountain rises 3000 feet above the west side of scenically famous Lower Priest Lake.

Thomas and Albert Kerr, who lived at the foot of the mountain, and the District Ranger, were the first to reach the fire. They had almost surrounded it by late afternoon when a sudden heavy wind carried it over their trench. They set to work again shortly after daylight and were joined later by Frank Lacey's four man trail crew. The first emergency men from Spokane arrived by evening and continued to come as rapidly as Forest Headquarters could obtain them:

but with 61 fires burning, no one fire could have as many men as it needed.

On July 16th, humidity had reached its low ebb and the general inflammability of the forest, a high point. Early in the afternoon a brisk wind arose. The entire mountainside became a mass of boiling smoke. The roar of the flames in the tops of the trees could be distinctly heard two miles away . . . the entire atmosphere was oppressive with the odor of burning forests.

I came back to the line just in time to meet the men retreating. The fire had jumped and was roaring up the mountainside at the rate of several miles an hour. It formed a wall of flame a hundred feet high. Its appearance was truly terrible, because it was so absolutely beyond the power of human control, so absolutely fatal to all life within its path. One moment a beautiful green forest, the next gaunt, black, blistered trees, with shriveled branches and leaves. One could imagine with horror what any human life caught in the holocaust would resemble, and this horror was given added reality by the knowledge that somewhere up the mountainside a crew of a dozen men under young Albert Kerr was cut off by the flames.

Nothing now could be done either to help the men or to check the fire. The men were already either safe or burned to gruesome ashes. The fire had gone absolutely beyond control and it was useless to imperil more lives. Nonetheless, Frank Lacey, who was in command at the fire, reconnoitered and with old Thomas Kerr, father of Albert, made an unsuccessful attempt to work around to the other side of the fire. Kerr felt confident his son was safe, but was greatly worried and almost exhausted, for he was over 60. He wanted to try again to reach his son, but this we could not permit. We set out ourselves. We found the fire still impassable, so reluctantly returned to camp. After supper, with new men arriving and supplies coming in, it was not quite so difficult to await news of the trapped fire fighters, but when they strolled into camp at eight, we all were tremendously relieved.

When the flames swept by, cutting off their path to safety, some of the men, very green at firefighting, started the hopeless task of outrunning the flames; but young Kerr commanded them to return under threats of violence. They obeyed and consequently are alive. He led them to a rocky point where they waited for hours while the fire burned all around.

That night we climbed a knoll from where the entire fire was visible. The sight was one such as must have inspired the ancients when they conjured up the picture of a seething, red-hot Hades. Probably Aetna in eruption, viewed in the blackness of midnight from some neighboring peak, resembled it. Over the entire mountainside hung a lurid, shifting, molten, fiery vapor, like the burning gases of a nebulous planet. It was an effect wrought by one of the most terrible elements — fire, with smoke and wind on a starless night. There was nothing solid or tangible about it; it was like some ghostlike picture without form or substance, showing the unconquerable, awful power of Nature.

Every afternoon I walked 6 to 12 miles, up hill and down, over exceedingly rough terrain inspecting the fire line, and, by the end of the fire, I knew each of the 109 men by name. Six were regular Forest Service employees, four were hired for the summer as a trail crew, in which capacity they were equally intended as a nucleus for firefighting, and two were local ranchers.

The other 97 were picked up on short notice in Spokane. They were, for the most part, the type of men who could not hold a permanent job. They had little sense of responsibility, and their main effort was to get as much time and do as little work as possible. Their conversation was largely dirty and their thoughts uninspiring. However, these men seemed quite different on the fire line as individuals than as a group in camp. Once I learned their names they became more confidential and revealed their good traits and the tragedies which reduced many of them to their present extremity. There were among them a number of superior men who were brought to forest fire fighting by ill fortune and a desire for adventure.

When the fire ran wild, it rendered valueless about one-third of the line already constructed. A vigorous fresh start was made and the work of surrounding the fire with a strong line was pursued steadily for the next week. A heavy patrol was necessary during the crucial period of the early afternoon. At times, as the fire raged fiercely to the edge of the trenches, we feared

critical points would be lost. The fire occasionally did jump and a new line had to be thrown swiftly around it.

One o'clock on the 22nd, just as I reached the pumping crew, it started to rain. Progressing along the line, the generally unemotional men smiled and laughed and sang in the drenching downpour. Firefighting is a very unpleasant occupation and, even to the jobless men, the prospect of release was an all-absorbing delight.

Where the two wings of the fire line finally met near the top of the mountain, Old Man Kerr, who had struck the first blow against the fire, drove in the "golden spike" — in the form of a peeled hemlock pole.

It had taken eleven days, 7½ miles of trench (not to mention the two that had been lost) and almost a thousand man days of labor to complete the job. Probably 2000 acres were destroyed. The cost to the government in suppressing the fire was not less than $5000. I cannot estimate the value of the timber destroyed.

The fire over, except for final patrolling, I set out for St. Maries to join the White Pine Study Crew more than a week behind schedule.

Beardmore Camp 1,
Kaniksu National Forest
October 17, 1925.

All the way here from Newport, the effects of this terrible fire season were apparent, not so much in burned-over areas as in burnt-out men. When I left the forest on July 26th, things, instead of being almost over, were just commencing. From July 12th until about September 15th, the fires taxed every available resource, and the permanent force on the Kaniksu was kept constantly on the go.

Although field work is now nearly completed, office work is just beginning. Poor Francis Carroll, Deputy Supervisor and Fire Chief of the Forest, who looked healthy and vigorous when I bunked with him my last night on the Watson Fire, now appeared ragged and worn out, as he struggled in the office until 11 P.M. explaining how $160,000 were spent in suppressing dozens of different fires. After his summer's work, he deserves a long vacation, instead of working double hours. However, only half of the firefighting is in the field, where every ounce of energy must be thrown into the work of fire prevention and suppression. The other half is in the office, where the unavoidable accounting must be done and preparations for the next year must be made.

I also saw Frank Lacey, the $100-a-month trail foreman who commanded the fire fighters with such great courage and skill at the Watson Fire. He looked like a dehydrated scarecrow, but I suppose he will recuperate this winter — on his own time.

At the Falls Ranger Station we met old Jim Murray. There were deep, unnatural circles under his eyes, and he looked to be about a hundred, although actually he is only in his forties. He had had three big fires on his hands, not to mention several dozen smaller ones, which were kept from becoming big ones by his prompt action. Simultaneously he had all the normal duties of a District Ranger. Mrs. Murray, during this time, had performed all the customary unpaid offices of a Ranger's wife, answering the telephone at all hours of the day and night, looking after whoever might breeze in at any hour, attending to the office work, while her husband and his assistants were away fighting fire, ordering supplies for the fires and seeing that they were delivered, and dozens of other minor jobs. When the strain ended in September rains, she suffered a nervous breakdown.

These were the human costs of forest fires which are not expressed in the $160,000 expenditure for suppression, or the thousands of acres burned. They are phases of the job that must be accepted, and are accepted quietly, if not pleasantly, by the underpaid protection force. The three men I have mentioned probably will not rise very high in the service because they have not had the necessary education. They know they are throwing into the work far more than they get out of it. I know of very few men in the U. S. Forest Service who do not do the same. The spirit of Service, from the Chief Forester down, is truly remarkable.

Forest Experiment Station
Priest River, Idaho
November 9, 1925

The other evening we reviewed the past fire season and considered what might have been done with the money wasted in fighting fire (Continued on page 330)

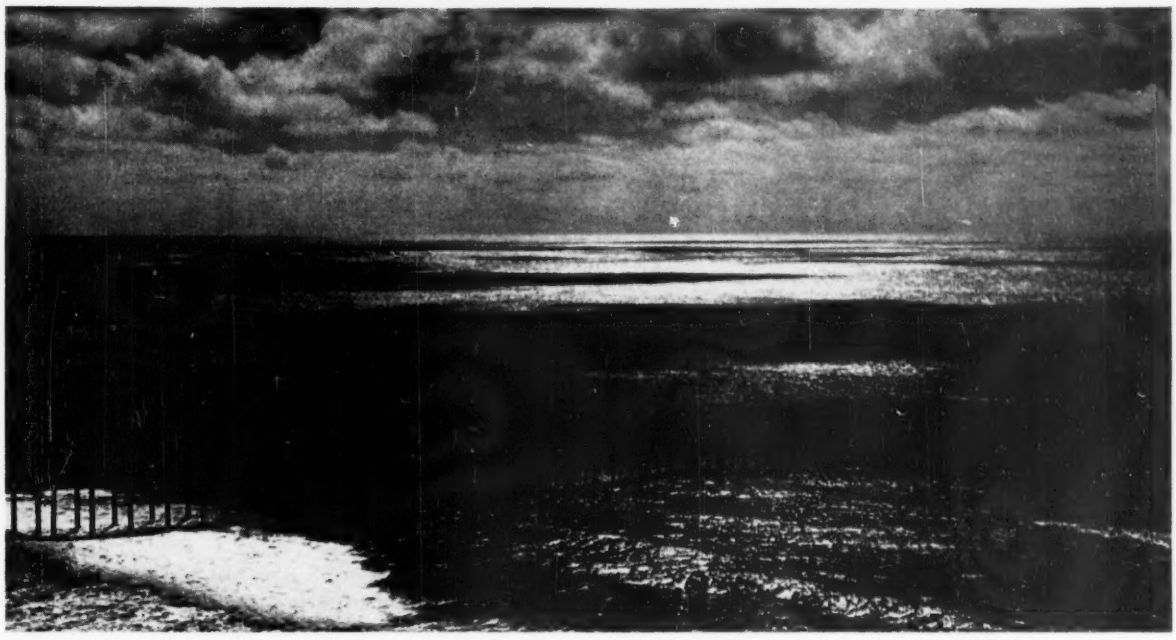
Forest Demon

By JANET MOORE

Have you seen a wild-fire demon
Racing, leaping in high tree tops,
Roaring through the firs and spruces
In savage fury nothing stops;
Glimpsed through smoke the sky turned sulphur
And the sun a red-hot red,
While flesh of living trees is kindled
By sparks from their brothers newly dead?

Have you heard their bodies crashing
Loud as the thunder of Thor's black wrath;
Have you seen the forest's wild things
Fleeing, panting from its path;
Seen ten thousand timbered acres,
Three patient centuries agrowing,
Changed in one September daylight
To smoking stumps and bare snags glowing?

Have you seen a dreary wasteland
Of blackened stumps and fire-felled pines,
Giants once, now useless wreckage
Half-hid by bracken and trailing vines?
Sadder still the naked ghost trees
Bleached bone-white by rain and sun,
The standing dead who mutely witness
What careless hand of man has done.



The ocean as seen from the pier of the Scripps Institution of Oceanography at La Jolla, California, a suburb of San Diego.

Secrets of the Deep

By MARGARET ROMER

How BIG is the ocean? If all the land in the world, mountains and all, were dumped into the sea, and the ocean bottom smoothed off evenly, this whole earth of ours would still be covered 7500 feet deep with water. That is nearly a mile and one-half. The average depth of the seas is now about two and one-third miles.

All the oceans together make up a continuous body of water that surrounds all the land. They cover all but one-fourth of the earth's surface.

The sea has 300 times as much living space as the land. Four-fifths of all the species of animals in the world, not counting the insects, live in the ocean.

Scientific study of this vast under-water world is the purpose of the Scripps Institution of Oceanography of San Diego, California. Only marine research and graduate work are done here, leading to the degrees of Master of Science, and Doctor of Philosophy, in Oceanography. It is one of the eight campuses of the University of California, comprising 178 acres of beautiful hillside overlooking the sea.

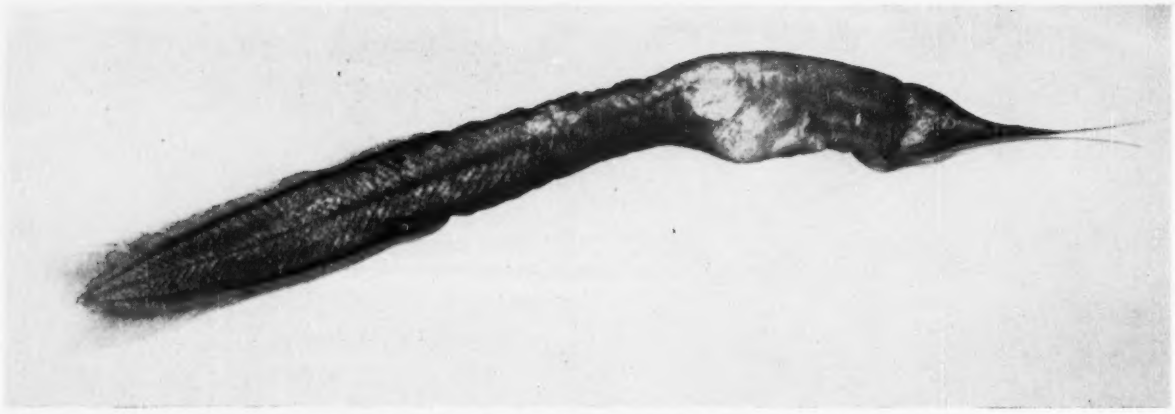
As a college, it is not large. The teaching staff and research scientists combined constitute an academic personnel of about 116. But the results of their studies are far-reaching. Their findings affect the operations of the United States Navy in the Pacific. These data are counted on by the United States Weather Bureau, by the fishing industry, and by many other departments of government and by various industries.

The scientists of Scripps Institution discover and explore the ocean's mountains and canyons, and make maps of the ocean bottom. They graph the temperatures of the water at different locations and different depths to learn more about its movements and behavior. They study the plants and animals of the sea. There is so little yet known, and so much to be learned about the vast, mysterious region below the water's surface, that it is an exciting and challenging field of study.

The Institution maintains a research fleet of five ocean-going ships, of which the *Horizon* is the flag-ship. This vessel is 143 feet from bow to stern, with a beam of 33 feet. Aboard is a large laboratory with adequate working space. It is equipped with radio, radar and sonar, and it has living accommodations for about twenty-seven scientists and crew members.

The *Spencer F. Baird* is equal in size to the *Horizon*, has the same cruising range, 10,000 miles, and is equipped to accommodate thirty-seven men. Only recently has been added what is probably the largest fishing line in the United States. This is a steel cable six miles long, and weighing more than nine tons. What it brings up is often more fantastic than any fish story ever told.

This line is capable of bringing to the surface three tons of sample plants, sea animals, water samples, sea-bottom ooze, or whatever it is rigged to carry. It may



Cyema, or "bob-tailed eel," was caught off Baja California in water more than a mile deep. The species is uncertain.

also convey instruments to measure temperatures, pressures, or currents. It is, so to speak, a robot explorer.

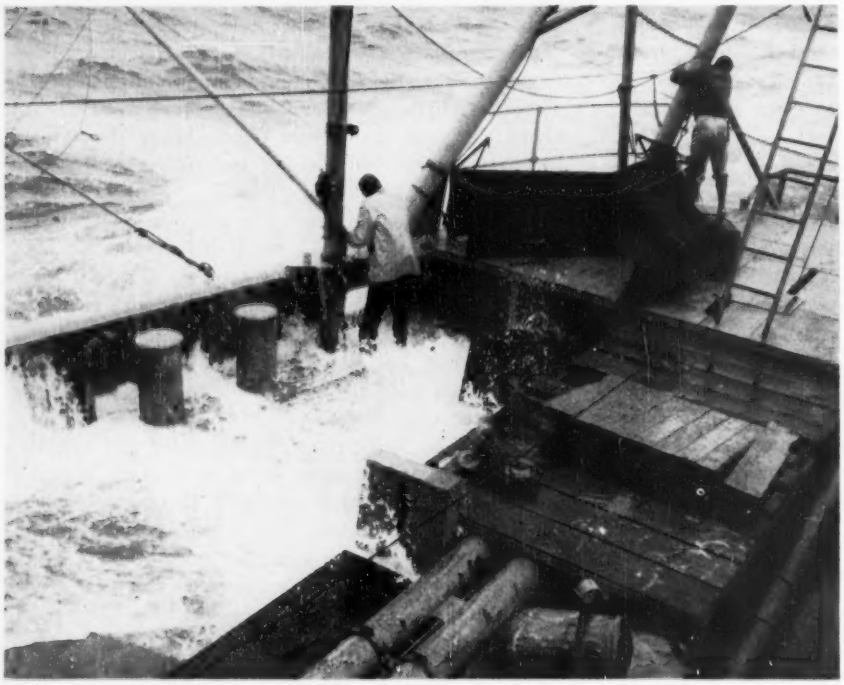
The other vessels of the research fleet are the *Crest*, the *Paolina T.*, and the *E. W. Scripps*. There are many small craft besides; among these is a grotesque amphibious vehicle with which it is possible to drive right into the sea.

The Institution's ships bring weird creatures to the surface. People never saw such fantastic living things in their wildest dreams! Specimens of these dwellers of the deep may be seen in the new and free aquarium-museum at the Institution. Some of the fascinating sea animals are now living in the aquarium; others are exhibited as mounted specimens. Many queer forms, too small to be seen or mounted, are faithfully and realistically reproduced in enlarged form, colors and all, in plastic.

That old belief that deep sea fish have no eyes, just is not true. Many of them have big bulging eyes and luminous bodies so they can see each other in the darkness of the great depths.

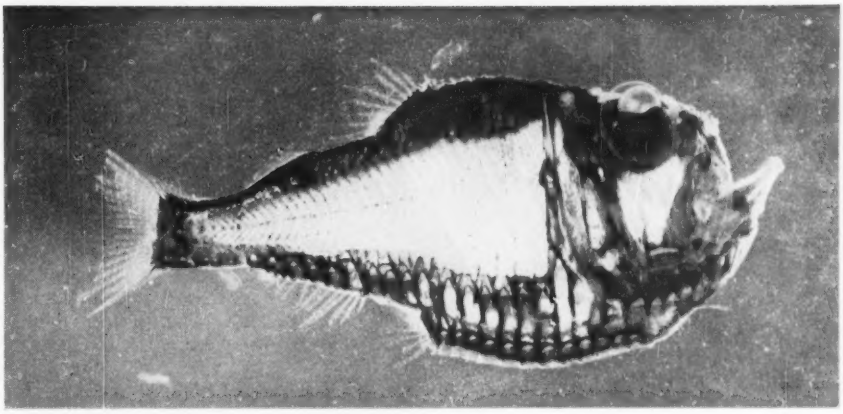
One of the creatures dredged up is called the round worm. It looks like a piece of white wire all tangled up. Another may be one of the jelly-fish, looking like a dainty, beautifully decorated open parasol, with pink spiral curls hanging from the under side.

Then there is *Pleurobrachia*, or sea gooseberry, perfectly round, opaque, and ribbed like a gooseberry. On opposite sides are two slim, graceful, flexible, hairy appendages. Another beauty is a purple ball with spines all around it. Some creatures, not so beautiful, look like spiders. There are more than one hundred different kinds of sea snails, some of which are exquisite, or the haul may include clams, and so on and on in infinite variety.



Aboard the *Horizon*, one of the Institution's ships. Note the mid-water trawl lying on the deck.

Many such specimens have been brought to the surface with the use of the lately invented mid-water trawl. This is a mesh trap so weighted that it can be suspended at any desired depth. Its purpose is to find out what lives at various depths in the dark



The species of this *Argyropelecus* is uncertain. It was caught in water more than a mile deep off Baja California. The specimen is about three inches long.

waters between the sunlit surface and the ocean floor. These trawls are ten feet across at the opening and about thirty feet long.

Excitement prevails when these nets are pulled up. There is a feeling of expectancy; an unspoken query of "Now what have we got?"

The Scripps Institution of Oceanography has conducted three major sea-exploring expeditions since 1950. In that year, the Mid-Pacific Expedition was carried out jointly by the *Horizon* from the Scripps Institution and the EPCE(R)-857 of the United States Navy Electronics Laboratory at San Diego. The investigation centered in the vicinity of the Marshall Islands in the Pacific. More than 25,000 miles of continuous soundings were taken, with the resulting discovery that about four-fifths of the ocean floor is mountainous, and only about one-fifth is flat.

A mountain range was discovered. It was about the size of our whole Rocky Mountain chain, running northeast and south-west. It lies west and south of the Hawaiian Islands. This ridge was named the Mid-Pacific Mountains. Besides this range, several isolated sea-mountains were found. Otherwise, the findings of this expedition were less spectacular, but, perhaps, more useful to science.

In 1951, Operation Northern Holiday was carried out in the North Pacific. The *Horizon* cruised 8200 nautical miles in the Gulf of Alaska, and discovered a mountain two miles high, the summit of which still was under two more miles of water. It was named Scripps Seamount by the explorers of the sea deeps.

In 1952 there was Operation Shellback. A "shellback," of course, is one who has crossed the Equator. This expedition crossed and re-crossed the earth's waist-line many times while exploring the equatorial sea west of South America. The objective was to find out facts about the salinity, movement, and direction of movement of water at the Equator.

Each year since 1949, the University's research vessels have sailed 50,000 nautical miles between the Oregon coast and the tip of Lower California in the course of studies of the lowly little sardine. Sardines are big business in the West Coast fishing industry.

Weird creatures and mountains are not all that the marine explorers found in the ocean. Several huge deposits of manganese were discovered. This rare and precious element is used in the hardening of steel, in the smelting processes of lead and silver ores, and in the making of paints and colored glass. Any one of these deposits is estimated to contain about ten times the total annual production of manganese from all known land sources combined.

Yet the surface of the ocean floor has not been even scratched. Who knows what other mineral wealth lies hidden in those huge mountain ranges under the sea — Nature's storehouses for future generations?

Let's Go Berrying

By MABEL IRENE HUGGINS

IT IS berry time. Can you fill your basket in the following berry patch? The clues will suggest the varieties of berries that you should find. Answers on page 330.

1.	berry	stalks of grain after threshing	9.	berry	a bison
2.	berry	a witch	10.	berry	a marsh
3.	berry	a water fowl	11.	berry	color of the sky
4.	berry	a game bird	12.	berry	an adult lamb
5.	berry	a stimulating beverage	13.	berry	an Indian woman
6.	berry	opposite of white	14.	berry	a male deer
7.	berry	a coarse file	15.	berry	the front of a woman's bonnet
8.	berry	a tree used for Xmas decorations	16.	berry	a hare

Stranger in the Sanctuary

By ELMA DEAN

Photographs by Thane Riney

THAT Sunday morning, late in June, 1950, I was lying wide awake and listening to the bird chorus outside the open window. Then I heard it! Instantly my husband, whom I thought asleep, said: "Do you hear a strange bird?" How could I miss the bright, short, lyrical whistle that rose above the native chorus much as the voice of Lily Pons would stand out in a group of ordinary singers? It came again and again, with short pauses between.

A front view shows the large area of white on the stranger bird. The crest is more erect even than that of the Steller jay and gives the bird an "important" and cocky look.

Although I hurried into my clothes, the singing had stopped by the time I was out under the pines. I could see no strange bird. Song sparrows, juncos and house finches fluttered hungrily about my hands as I refilled the feeders. A russet-backed thrush darted in for a seedless raisin. On the crumb table a dignified and unhurried male black-headed grosbeak collected a load to take back to his nestlings. On other mornings all this activity would have interested me vastly. But my eyes kept wandering over the pines, toyons, and wild currants in the bottom of the ravine we call The Gulch. Then I turned to the fuchsia thicket nearby.

I was about ten feet away when the bright whistle came from among the red and purple blooms and the green leaves. I caught a flash of white deep in the old bush; then a short, sharp, two-noted whistle I could easily have imitated. It said, plainly enough, "Woman, stand off!" Finally, out of the old fuchsia, the stranger darted, down to the bird bath under a big pine. The bird's wings almost fanned my face. No wonder the song was strange; it was a bird I had never seen on land or in book. It wore a high black crest, glossy black, was about eight inches long, with back and tail plain dark brown. Under the black crest, which continued into a black mask to the eye level, was a pure white face and throat, clouding into pale gray on the breast. A thin line of black tied the mask to a dark shawl that did not meet across the white of the throat. There seemed to be a dash of bright red just back of the eyes and more red under the tail. The tail, too, had a tipping of pure white. All this I observed because the bird took a long drink in spite of its nearby human audience. After thirst was quenched the bird flew back into the fuchsia from which it had appeared. This time it did not hide but swung on an arched branch and whistled again and again the lyrical notes that had hurried me from my bed.

The notes were delivered rapidly, each time five, but not always in the same order. Each note was full and round, without blur or buzz, and, at close range, quite loud.

Daily we expected the bird to be gone and were foolishly delighted to be awakened by the bright, short whistle. Following the whistle, there was often a prolonged chatter, a kind of scolding, especially if too many juncos crowded the old fuchsia bush. The other birds accepted the stranger, but were not chummy. Only one song sparrow, no mean singer himself, seemed fascinated by the new song and followed the visitor about like a shadow. Once I saw the sparrow cock his head to one side, listening.

Trying to put the bird's song down on paper, the word "Peter" seemed to fit the syllable arrangements as well as anything; besides, the two-noted call sounded so much like "Pet-er" that we were beginning to refer to him as "Peter." The following is the word interpretation of the song's different arrangements. (The italic syllables have about the same value or length as a half note, the others, a tone higher, being quarter-note value) (a) *Pete*-peter-er-*pete*, (b) Peter-peter-*pete* (c) *Pete*-peter-peter (d) Peter-*pete*-er-er. The alarm note was "spoken" sharply "Pete" or "Pete-er."

All the books were searched in an effort to identify the stranger. Our professional bird friends came, saw him and heard him and were delighted. But they shook their heads. Some of them could only suggest the bridled titmouse because of the crest. But this was no titmouse, we were sure of that.

Peter seemed to enjoy oatmeal and peanut butter along with the sparrows and juncos, and the elderberries and wild currants with the robins and thrushes. An apple on a nail on the back fence pleased him. But he did not pick for long periods at any food as did the native birds. He ate a few bites, flew to the bath, drank and bathed and then sat long on a branch of his fuchsia, arranging and preening his feathers and occasionally singing his unusual song.

The stranger made shorter, more deliberate flights than many of our natives; no darting hither and yon without plan; no long take-offs into space. He was definitely a bird of bushes and low branches of trees. After many days of watching I discovered another reason (aside from just preening) for the bird's sitting in one place for a long time. When the small brown moth common among our pines came close, he darted, lightning-like, from his branch, captured the moth unerringly, and returned again to his quiet sitting. Now we knew how he had subsisted before he came to our well-stocked sanctuary.

The thick white fluff of feathers on either side of the face probably accounts for this bulbul being referred to sometimes as "white-cheeked." As she flies at the native toyon berries hanging in clusters there is a gleam of white undertail feathers and a flash of reddish-orange undertail coverts. From above she presents a dignified dark brown back and a black satin crest. The bright red just back of the eye is only seen at close range.

It was getting on toward fall and we had not yet learned our visitor's identity. Then we met a young man whose hobby was rare birds. He came to see Peter and we walked slowly under the pine trees, I whistling my not-too-good imitation of his song. Finally the answer came, quite near. In an open and sunny place a little peach tree held a few yellow globes and there was Peter, taking his share from each of them.

"A bulbul," the young man said at once, "an Indian or Chinese bulbul, the one called white-cheeked or red-whiskered. He must have escaped from a cage or aviary." And, as if Peter feared the stranger or remembered the cage, he flew in his deliberate manner into a tall pine and was silent.

"He'll like bananas," the young man said as he left. And sure enough, hardly had I put the banana on the feeder, an inch-wide strip of skin peeled down, than Peter came to it, and, sticking the black beak into the soft fruit, made contented clucking sounds that we interpreted as "Golly, bananas!"

The days of the molt over, Peter was smooth, handsome and thriving. He was the talk of the neighborhood. He sometimes made the rounds of the nearest neighbors, singing a little here and there but never

staying long away from home in our sanctuary.

By this time nearly all the native birds had learned to eat bananas. My husband said, with a grin, "So, I should buy bananas for all the birds in California!" But he, too, enjoyed seeing Mama Russet Thrush poking banana into two quivering offspring. Probably, too, we saw the first robins to be brought up on the tropical fruit. They had Peter to thank for their fancy diet. When the bananas disappeared very fast we wished we might put up a sign on them "For Peter Only." But our grocer, hearing about the stranger, saved all the over-ripe ones and donated them to the cause.

It was nearly time for the winter rains. Any day the wind might come in from the sea, snapping off the exotic tree dahlias and the tall, brittle fuchsias. We were fearful for Peter. We were not sure how soft his cage life had made him; just how long it had been since he flew wild in his native India or China.

After one of the hardest blows and heaviest downpours in California history, I went anxiously out to refill the feeders, stepping over fallen pine branches and looking among the storm's debris for what I feared to find. Wet sparrows, finches and juncos came close for their breakfast, but still no Peter. Then just as the first pale sun struck sparks from the dripping trees, the song came—never sweeter, never more welcome. And the next moment a wet but cocky Peter landed on the feeding tray and went to work on a fresh banana. By what magic do birds weather storms?

Toward spring of 1951 Peter's song, which we thought perfect, added new notes. Sometimes there were six or seven instead of five, and arranged to suit his whim. The extra notes were not long but more like grace notes worked into the same timing. And they were often sung from a high wire running across the small ravine or gulch to the neighbor's house above the road. I suppose it was pure coincidence that, as he sang, he always (at least when I saw him) faced the Golden Gate — the way toward China and India.

The spring urge began to get into Peter. He became enamoured of the purple finches and linnets. Once I saw him make quite intimate advances toward a female purple finch. I expected a battle with the male but nothing happened. It was not until the following year that I understood why.

We were sorry for Peter and searched all the pet shops for a female bulbul. Strangely enough the warmer the weather became the less we heard Peter sing. But he began collecting nesting material, and, all alone, built a nest in the green tip of the lowest branch of a big pine above the gulch. My husband said: "It must be a female, building a nest like that." But I held out that it was a male, and reminded him of the song and the aggressive behavior toward the female purple finch. Still, in my own mind I was not quite sure. After a great many trips had been made with bits of paper, twigs, bark strips from woody old fuchsias, pine needles and soft grasses, the bird began to stay on the nest for long periods, coming down only at intervals for food. Often, just to confuse me, I thought, Peter flew to the high wire and sang all the different arrangements of his delightful song. Still, the singing was not nearly so frequent as in the winter and early spring.

I was further convinced of Peter's maleness when he battled off the California jay, flying at the big blue vandal almost twice his size. At such times the neat little red spot by each eye could be extended nearly an inch and made to quiver menacingly, while the bulbul chattered loudly. The bluejay, having never before met such a hot little antagonist, left the nest and the sanctuary in a hurry. Another time I saw little Peter lead an attack against a jay that was about to rob the nest of the brown towhee of its newly hatched young. The towhee had hardly shrieked alarm when at least a dozen birds, headed by Peter, were in pursuit of the fast disappearing jay. Peter came and sat on his fuchsia when the trouble was over and "talked" about it for about five minutes. It was as though this little bird had become a self-appointed policeman of the home he had found and liked so much.

Peter finally gave up the rigors of nesting and became the singing bachelor once more, friendly with his human benefactors, whistling an answer as long as we cared to try an imitation of his song or call.

I keep saying "he" because it started that way. But in the spring of 1952 the nest building began again, this time in a fuchsia thicket near a bedroom window. Just after the coarser outside had been placed, a neat weaving of pine needles and grasses was added. At the very last "Peter" went into the green Breath-of-Heaven bush and broke off a small scented twig and placed it in the finished nest. Now I really was at sea about the bird's sex in spite of the song and the battles. In a few days I no longer wondered. One small, heavily brown-spotted egg lay in the nest. She sat for the allotted time and of course nothing happened. Undismayed, she pushed out the infertile egg and, building a new nest on top of the old, even to adding another bit of the scented bush at the last, she laid four more of the odd-looking little eggs and sat (Continued on page 332)

Child's Query

By MABEL IRENE HUGGINS

Do foxgloves slyly creep by dark
And listen to the dogwoods bark?

Do tiger-lilies stalk their prey,
And larkspurs sing at break of day?

Do pussy-willows softly purr
And cat-tails neatly lick their fur?

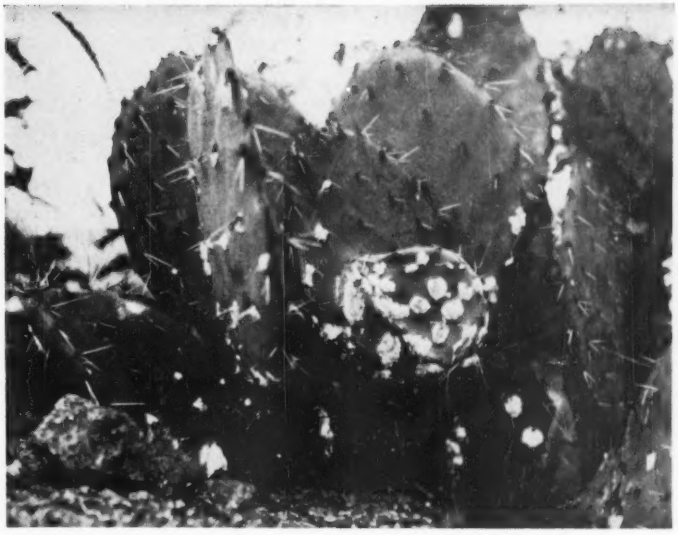
Do cowslips moo and ask for more,
And dandelions loudly roar?

Do oxeye daisies graze by day?
Since I can't answer — come, let's play.

Cochineal—

Gay Color Source for the Aztecs

By EDNA HOFFMAN EVANS



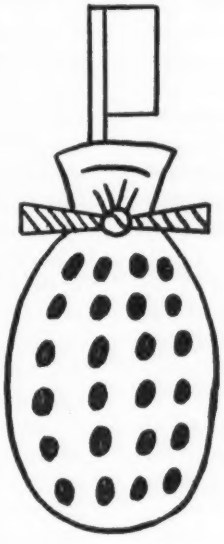
An opuntia cactus plant playing host to a number of colonies of cochineal bugs. Under each of the white cocoons, which are really waxy scales secreted by the adult females, are to be found the bugs that once provided Aztec emperors with crimson and purple dye for the royal robes.

GROWING on some of the opuntia cactus plants that thrive in the southwestern United States and Mexico are patches of cottony white fuzz, cocoons of the cochineal bug. Cochineal is of little importance now. But for observers who know about its past and who possess imagination, the white patches can open up realms of fancy, visions of the days when mighty Aztec kings and powerful warriors wore garments dyed purple or red with colors obtained from cochineal.

Today aniline dyes have taken over most of the uses once supplied by cochineal bugs. No longer are the insects torn from their cottony shelters to provide brilliant colors for textiles. However, the cochineal industry does continue on a small scale in the State of Oaxaca in Mexico, and in India. There is a small but steady commercial demand for cochineal to be used in artists' colors, particularly for the color called "crimson lake," as coloring in food products and soft drinks, and in cosmetics. The carmine used to stain slides of tissues and cells in biology and histology is also derived from cochineal.

The cochineal bug is a member of a large family, which also includes the mealy bugs and the scale insects. Older accounts trace the source of the dye to one insect, called *Coccus cacti*, because of its favorite habitat. More specific modern entomologists recognize several different members of the family, among them being *Dactylopius coccus*, the Mexican variety, and *D. tomentosus* and *D. confusus*, which are found in California and Arizona.

Mature male and female cochineal bugs differ vastly in appearance. The males undergo a complete metamorphosis, from tiny transparent eggs through nymph, to the adult stage. As adults, the males have red bodies, nearly covered by a pair of delicate white wings. Oddly enough, their mouth parts, which were efficient plant-juice sucking devices in the nymph stage, are undeveloped in the adult so the male cochineal bug eats nothing. He is, however well equipped with three pairs of simple eyes.



This is the symbol that the Aztecs used to designate 20 bags of cochineal bugs, dried and ready to be used as dye. The flag-like symbol protruding from the top of the bag is the Aztec sign for twenty.

The adult females, which are about the size of a match head, and therefore much larger than the males, are scarcely more than efficient egg-laying devices. They are wingless; their legs, beaks, and antennae are all rather small. Specialized organs secrete the waxy white fuzz that surrounds them, and beneath this protective covering live colonies of the insects — females, males, eggs, and nymphs. Of the total, the adult males are a small minority, their ratio being about one male to 200 adult females.

In former days, both before and after the Conquest, cochineal bugs were cultivated in Mexico with care rivalling that once given silkworms in the Orient. Vast stretches of nopal cactus, *Nopalea cochenillifera*, were given over to the fuzzy white cochineal cocoons. Before each rainy season set in, branches of opuntia covered with the insects were cut off and carried to shelters to protect them from the weather. Then at the close of the wet season in mid-October, the cactus plantation was restocked from this supply.

Since each female quickly produced about a thousand young, and since in turn the young females were soon able to reproduce, the cochineal crop grew rapidly. The first installment was ready to be harvested in December, with successive harvests to May.

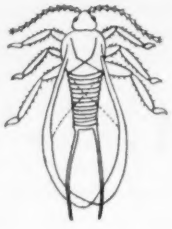
Harvesting was a rather tedious process. A laborer, who picked off the swollen female bugs with a blunt knife, could collect only enough to make about two ounces of cochineal per day. Even so, he collected a sizable number of bugs, since it takes about 70,000 of the insects to weigh a pound.

Two methods of drying the bugs were used. By one process, the bugs were dipped into boiling water and the result was "black cochineal," or *Grana nigra*. By the other process, the bugs were killed with dry heat, in an oven or on plates of hot iron. This second process produced the best grade of cochineal, known as "silver cochineal," or *Cochinilla jaspeada*.

No one knows when the coloring properties of the cochineal bug were first discovered. However, it is not difficult to see how they came to be known. Pull open one of the cottony cocoons, or crush it between thumb and forefinger. The digits are immediately stained a bright mulberry color. Used with different bases — alkalies or inorganic acids — cochineal can produce tints ranging from brilliant scarlet to purple. Because of this characteristic, chemists have used cochineal as an indicator to determine alkali carbonates and inorganic acids. With alkalies, cochineal turns violet; with acids it is yellowish-red.

The adult female cochineal bug (left) is an egg-layer, and little else. Her antennae, beak and legs are scarcely large enough to matter. Her body is stuffed with eggs ready to be laid.

The adult male cochineal bug (right) is only about one-sixteenth of an inch long and the females outnumber him almost 200 to one. His body is bright red, and is nearly covered by a pair of delicate white wings. Two long, flowing streamers of wax are attached to the last segment of his abdomen, apparently for ornamental purposes.



The Indian residents of Mexico and regions to the south knew about cochineal long before the coming of the Spaniards. Being lovers of bright colors, they treasured the source of such brilliance. The Aztec word for cochineal was *nocheztli*.

Emperor Montezuma included forty bags of cochineal among the tribute he demanded from vassal towns in Mexico. Other items of tribute on the same roll included two strings of jade beads, twenty bowls of gold dust, a royal headdress of brilliantly colored feathers, eight hundred additional bunches of feathers, warriors' costumes, and 1606 blankets.

One of the first sights that met the eyes of Cortez and his men when they viewed the huge market in the Aztec capital of Tenochtitlan (now Mexico City) were the piles of brightly colored cotton cloth, as well as other textiles woven from dyed rabbit fur.

Soon bags of cochineal were traveling to Spain, rather than to Montezuma's palace. After the Conquest there was no longer an Aztec ruler in Mexico. But Europeans like bright colors, just as the Central Americans did, and they welcomed cochineal to their stock of dye material.

For a time European dyers were not successful with the new product. Dyed cloth did not retain its brilliant color after washing. A mordant was needed, some substance that would serve to fix the color in the cloth. By accident a Dutch experimental chemist, Cornelius Van Drebbel, solved the problem sometime between 1630 and 1650. He used tin oxide, made by dissolving tin in aqua regia (a mixture of nitric and hydrochloric acid) and the gorgeous colors from cochineal stayed in the cloth.

Cochineal culture spread to Spain, Italy, and to North Africa. The bugs multiplied wherever there was cactus on which to live. The cochineal industry flourished for two centuries, reaching its highest point in the Canary Islands between 1831 and 1874. It was produced commercially in California and New Mexico as late as 1871. Thereafter, it dwindled almost to nothingness as the cheaper, more easily produced aniline dyes forced it off the market.

But being dislodged from their place in commerce by technological advances and synthetic products has not bothered the cochineal colonies. Snug in their cottony cocoons on opuntia plants, the little scarlet insects thrive as contentedly and as prolifically now as they did in the days before the Aztecs and allied peoples first found in them the source of color and beauty

Ant City

By DANIEL SMYTHE

The great green forest flames afar;
A thousand wings rush by.
No glint for them of any star
Shows in their granite sky.

But in low avenues of ground,
And in that sleeping air,
So many secrets may be found
That few of us may share.

Roots of the trillium plant were eaten by American Indian women to prevent premature birth, and the root is found to contain the equivalent of progesterone, the female hormone.

Black Magic for Men in White

By DON ROMERO

Some years ago scientists pushing through the Brazilian jungle found natives catching twenty-pound fish by tossing bits of root into the water. The fish gobbled the root and a moment later, stunned, floated to the surface. The scientists discovered that the root was a powerful poison — Derris Root — and yet the natives ate the fish without experiencing any ill effects.

Today Derris Root — under the name of "Rotenone" — is used as a base for home and garden insecticides, and it shows promise of achieving widespread usefulness on the farm. Great Britain has recently passed a law requiring that it be used in every cattle-dip in the British Isles. And the U. S. Department of Agriculture is looking forward to the time when this powerful native poison — harmless to human beings because it will not readily dissolve in the stomach — will help to replace arsenic-base insecticides, some of which are dangerous.

Rotenone is only one of many important drugs which modern science has obtained — usually by accident — from "superstitious" natives. Leading medical researchers, no longer content to stumble on invaluable old cures, are now probing deep into the drug folklore of the world. They are convinced that in this untapped reservoir of therapy lie solutions to many medical mysteries.

Take the simple "leaf juice," or chlorophyll, which American Indians have used for centuries to treat wounds and burns. When medical researchers examined the juice they found that in addition to being an effective healer it also held some deodorizing properties, and service doctors use it in the treatment of malodorous wounds.

One day in 1942, while driving through the backwoods of Louisiana, Dr. I. W. Kaplan of New Orleans overheard some "cracker gossip" about using boiled-down mandrake — or podophyllin — as a treatment for warts. When he carried the yarn back to the local country doctors he was astonished to hear them reply, "We've been using that hill-billy remedy for years."

Years ago physicians asked African natives why they tried to relieve the agony of rheumatism with a willow-bark brew. When the natives replied: "It is the graceful flexibility of the willow that enters the stiff, painful joints of the patient," the medical profession rocked with laughter. Yet today the same profession is relieving the same agony with the same pain-killing drug — salicin — which the natives had unknowingly found in the willow.

For centuries the Peruvian Indians have used a balsam-bark solution which they claimed cured many ills. No one paid any attention to this "panacea" until a young Parisian medical student, Jacob Jacobson, found that the solution contained benzyl cinnamic ester, an aromatic substance considered valuable only as an ingredient in perfume. Practicing later in

Tunisia, Jacobson tentatively tried his discovery on a few patients suffering from trachoma, a highly contagious eyelid infection. To his amazement he achieved a complete cure in every case. He then found that his solution also cured corneal opacities, which cause partial blindness. He next tried it on a chronic infection of the middle ear, and found that that, too, was effectively cured. Next he found that his solution was an excellent remedy for scabies. Finally he tried it on a chronically inflamed lesion of the fallopian tubes, which even our most powerful antibiotics can not heal, and again found that he was completely successful.

In standard medical dictionaries benzyl cinnamic ester is now listed as "Jacobson's Solution." After using it for 35 years, Jacobson is convinced that, in addition to healing a number of other ills, it will cure *any chronic inflammatory lesion* no matter where it occurs in the body. "It would appear," says Jacobson, smilingly, "that the superstitious Peruvian Indians had something pretty close to a magic panacea after all."

One of this country's most ardent advocates of research into primitive cures was the distinguished Dr. Henry Hurd Rusby, late dean of Columbia University's College of Pharmacy. Thirty years ago Rusby heard that the Collahuaya Indians, "druggists of the Amazon," had compiled an unusual pharmacopoeia. He went to the Bolivian jungle, where he found the natives using a solution made from a tree bark. It was amazingly effective in relieving the "chest tightness" and excessive phlegm of bronchitis. Dr. Rusby introduced the medicine to this country, where, under the name of Cocillana, it has become the main ingredient of a variety of cough medicines.

Digitalis, one of the world's great medicines, is derived from foxglove, used long ago in Wales for ailments of the heart.

A more recent visitor to the Collahuayas is the noted Swiss anthropologist, Dr. Alfred Metraux, who is convinced that these natives possess the secrets of invaluable cures. "Take sarsaparilla," says Metraux. "When these Indians recommended it as the best cure for general debility, I decided that they were just superstitious savages. Then I made a surprising discovery. I found that the root of the sarsaparilla vine contains a powerful chemical which is the equivalent of testosterone, the male hormone, which not only regulates and invigorates a man's sex life, but also determines the vitality of his entire system."

Probably the greatest contribution the Collahuayas have made to the civilized world is curare, a powerful paralyzing drug which, applied to the tip of a hunting arrow, will drop the largest jungle animal before it has run 100 yards. As a muscle relaxer, curare is now one of medicine's useful drugs. Obstetricians use it to ease the pain of difficult childbirth. Psychiatrists, treating mental diseases with electric-shock, find it controls the resulting violent muscular convulsions. Therapists employ it to combat the muscular rigidities of tetanus, poliomyelitis and cerebral palsy. And surgeons have found it a virtual life-saver for patients whose weakened hearts are unable to stand the powerful anesthesia necessary to achieve complete operative relaxation. By combining the primitive drug, curare, with a light anesthesia, surgeons are now safely operating on millions of patients who, as "poor risks," would otherwise have had to forego the benefits of major surgery

Dr. Boris Sokoloff, of Florida Southern College, found that European peasants have anticipated modern science by several centuries. In his book, *The Story of Penicillin*, Sokoloff tells of seeing a Serbian peasant who had been gored in the shoulder by a bull. As he stared with horror, the peasant's wife promptly packed her husband's wound with pieces of moldy bread. "But he will get blood poisoning!" protested Sokoloff. "No," replied the other peasants, "he will get well. We have been using this treatment for generations." Sokoloff later discovered that in Greece, Yugoslavia and parts of Russia, peasants had been treating wounds with moldy bread, or clean warm soil, for as long as anyone could remember. Even today, in certain rural areas of this country, severe cuts are smeared with moldy cheese. Doctors agree that these substances might contain antibiotics similar to penicillin and streptomycin, but, like Sokoloff, they doubt if the concentration could be effective. "Although no medical man today would advise the use of such methods," says Sokoloff, "yet in some mysterious way, centuries before modern science made the discovery, primitive people in various parts of the world were already aware that certain molds and soil bacteria might heal infection."

An even more astonishing cure is one which dates back to the middle ages, when European peasants observed that bee-keepers seldom suffered from rheumatism. On this "quaint" theory the natives developed the practice of gathering bees in a cloth which they would then tie over a man's arm or leg so that the bees' stings would relieve his rheumatic limb of its agonizing pain. Understandably, this left doctors limp with hopelessness. Yet for the treatment of sciatica, neuritis, lumbago, or muscular rheumatism, Sharp and Dohme, a leading pharmaceutical firm, now manufactures a "Bee Venom Solution," which is even injected, bee-fashion, with a hypodermic needle. Many doctors have found that it will relieve the torture of these ailments, often permanently, with comparatively few injections

Those medical authorities now urging a closer inspection of folklore cures have only to point to a few of the all-important drugs bequeathed to civilization by the primitive wise men. As far back as 2700 B. C. the Chinese were making wide use of a drug known as *Ma Huang*, in which scientists in 1923 finally found ephedrine. A few centuries later Chinese warriors were staunching their battle wounds with dried toad skins, which contain the identical epinephrine surgeons now use both as a styptic agent and as a heart stimulant.

By 1400 B. C. the Assyrians were treating wounds with sea kelp, and goiter with burnt sponge, both of which are rich in the iodine we now use for the same purposes. Brazilian Indians were treating dysentery with ipecac 200 years before doctors recognized its derivative, emitine, as the "specific" drug for that disease. Digitalis, now described by doctors as one of the world's great medicines, is derived from foxglove, which was used by Welsh natives for heart ailments and dropsy as far back as the 13th century. Not until 500 years later was digitalis discovered by an English physician who, ironically, found grateful relief from his own dropsy in the great draughts of foxglove and beer, which were fed him by a wise "old wife" of Shropshire.

Even today dramatic primitive cures — most of them as usual termed "extremely improbable" — are appearing in characteristically haphazard fashion.

One of the most promising of recently discovered primitive drugs is Ch'ang Sang, which was brought back to this country by a missionary when he heard that Chinese medicine men had been using it for centuries to cure malaria. In tests on laboratory animals California Institute of Technology found that it was 100 times more powerful than quinine. But because of the present difficulty of getting the herb out of China, no tests have as yet been made on humans.

Another hopeful drug is the wild parsnip which was widely used by American Indians. Western Reserve University has found in laboratory tests that the oil from the parsnip is highly active against pneumonia, meningitis and "valley fever," an often fatal respiratory disease found in the Southwest, and for which modern medicine has never been able to develop a cure.

Mandrake, or podophyllin, has yielded a backwoods remedy in many parts of the country for many years.

American Indian women who lost their babies through premature delivery found that they could cure themselves by eating wild yam and the root of the trillium plant. Both of these roots contain the equivalent of progesterone, the female hormone, which obstetricians now administer as a standard treatment for women who suffer from miscarriage.

In cleansing a deep wound of its poison, doctors now insert a thin rubber tube inside of which a rolled piece of gauze drains off the infection. American Indians performed the same draining operation by inserting a piece of soft absorbent tree bark which carried off the poison in the same wick-like manner. To hold a wound closed until it heals, surgeons often use a small metal clamp fitted with sharp teeth. South American Indians accomplished the same result by letting a leaf-cutter ant bite the edges of the wound together, and then twisting off the rest of the ant's body, leaving his powerfully locked jaws to act as a clamp.

Anthropologists who have closely studied native medicine are convinced that many primitives were also

European peasants noted bee-keepers seldom suffered from rheumatism, so induced bee stings to relieve sufferers. Now a bee venom solution is manufactured to serve the same ends.

thoroughly aware that physical illness could be caused by prolonged mental anxiety. "There is no better illustration of this fact," says Dr. E. A. Ferguson, of Skidmore College, "than that the Hopi Indians define worry as 'something that collects in your stomach into a ball, and then rolls around in your body until it finally breaks out some place.' "

Dr. Thomas Lewis of the Revision Committee of the U. S. Pharmacopoeia, is a strong advocate of research into primitive cures. He believes that: "Even in this age of synthesized drugs, invaluable therapies may be lost to medicine if we don't make an exhaustive exploration of those cures which primitives apparently have always been able to find in plants." And Dr. Selman A. Waksman, Chairman of the Department of Microbiology of Rutgers University, and winner of the 1952 Nobel prize for his discovery of streptomycin, has stated: "Letters are constantly coming to us from all parts of the world, telling of strange primitive drugs. Even when these cures sound utterly fantastic, we make every effort to investigate them thoroughly — for we never know when one of them may be the clue to an important discovery."

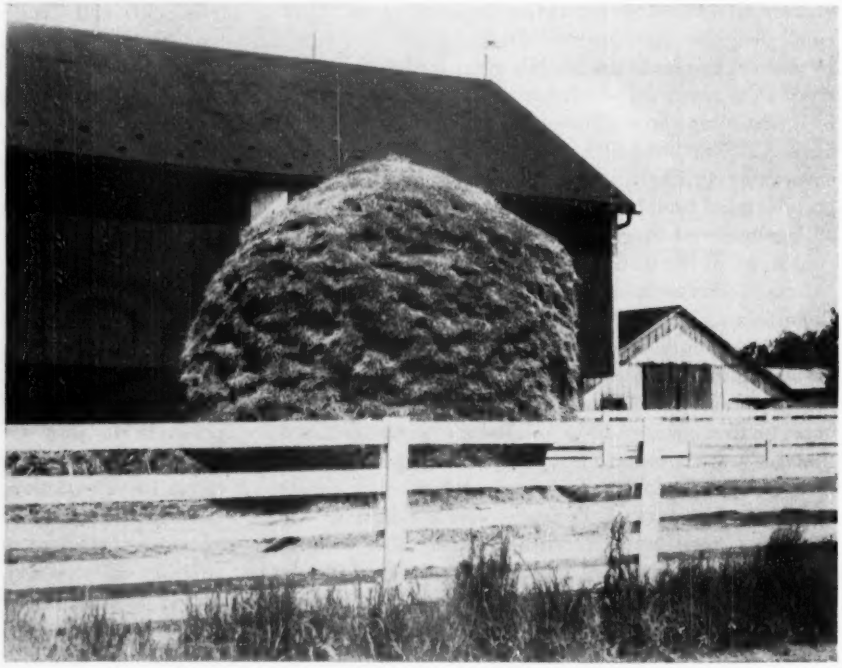
Through their branch offices in far-distant lands large pharmaceutical companies are now keeping a sharp eye peeled for any drug, however weird, which is reputed to possess "magical powers." Some firms, like Squibb and Company, make arrangements with missionaries, contractors and scientific expeditions to rush back by fast plane any rare herb which natives are found to be using widely. Other companies such as Parke-Davis, Charles Pfizer and Merck send out their own botanical scouts. The Upjohn Company collaborated with S. B. Penick and Company in financing a drug-finding expedition that traveled 13,000 miles across Africa.

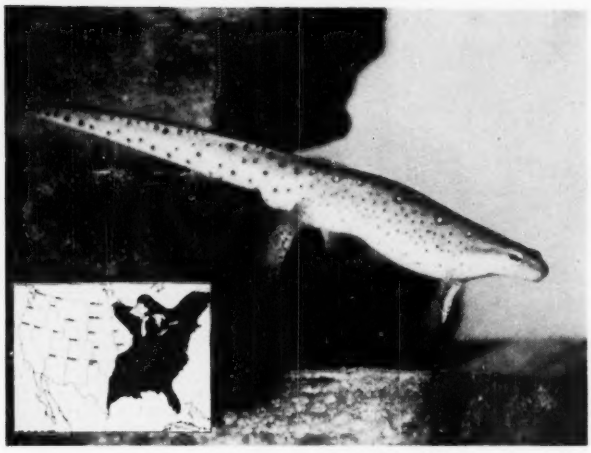
"It sounds incredible that scientists should be 'witch hunting' in the 20th century," says one company executive. "But we never know when we will find a plant which later becomes a household remedy."

Nests

By ROGER M. LATHAM

BIRDS have adapted themselves to utilize civilized man's structures and his various alterations in their environment. The chimney swift has adopted chimneys as a convenient substitute for hollow trees. Phoebes nest under bridges, robins use porches, and swallows have usurped barns. The picture here illustrates an unusual use of a strawstack by English sparrows. This unique colony nest was located near Chambersburg, Franklin County, Pennsylvania, and contained several dozen nesting cavities.





A salamander most often found in the woods is the common newt, *Triturus viridescens*, shown above, left, as an aquatic adult in its aquatic habitat under water, and, right, in its land stage. This salamander is a broad-tailed, olive-green amphibian. It is marked with a row of small, black-bordered red dots on the upper surface and a sprinkling of tiny, dark, irregular marks on a yellow under surface. It is aquatic except for a period of development on land after losing its gills. On land it is bright orange with black dots, and is called an eft. After a year — or sometimes longer — on terra firma, it returns to the water and transforms into the adult green phase. Average length 3¾ inches.

Some Salamanders

By DR. C. J. STINE

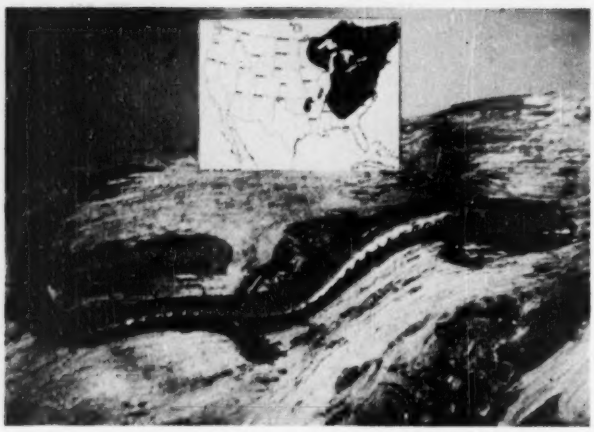
Illustrations by the Author

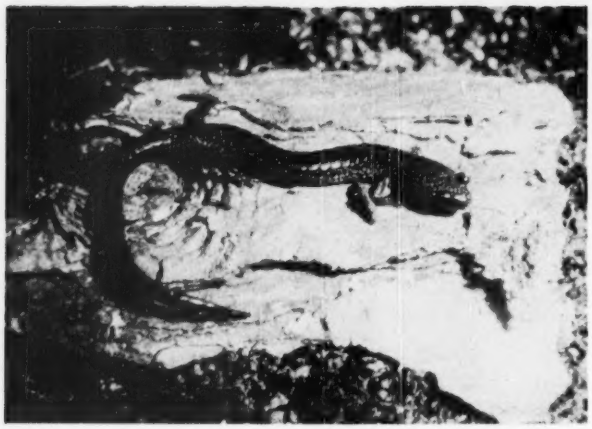
SALAMANDERS are near relatives of the frogs and toads, but lack vocal cords, and emerge at the close of winter without fanfare. They are cold-blooded animals that lay their eggs in water or damp locations. The young hatch as tiny, tadpole-like larvae; go through a period of gill breathing in the water; and turn to air-breathing, land-dwelling adults, with some exceptions.

Salamanders are often regarded as lizards, but salamanders have smooth, scaleless, somewhat moist skin with no more than four digits on the front feet, whereas our sun-loving lizards have dry, scaly skin with five digits on the forelimbs. Salamanders range in size from the meek little two-inch North American four-toed salamander to the giant six-foot salamander, *Megalobatrachus japonicus*, of China and Japan. There are no salamanders poisonous to man, although some forms secrete a milky-white substance from their skins that is distasteful to animal predators. Some of the larger aquatic forms can bite rather hard.

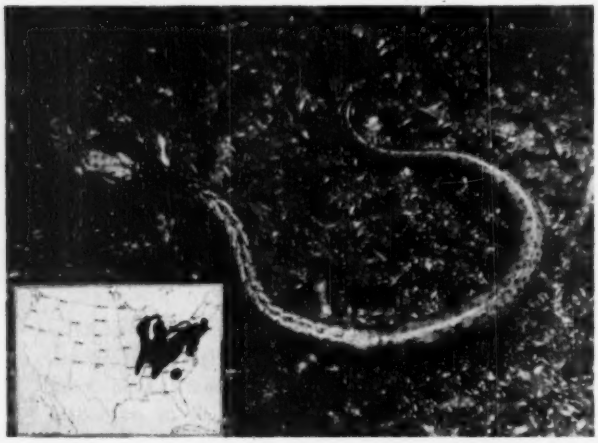
About two hundred and twenty-five species of salamanders are known, new species still being discovered. More kinds live in North and Central America than in the rest of the world together, particularly in our mountain sections with their springs, streams and wet ravines. Many salamanders are essentially lungless and respiration takes place mainly through their thin, highly glandular skin. If they are exposed to dry environment they rapidly desiccate. Each species of salamander has its own season for reproduction, but as a group some mate the year round. A few robust species propagate even in the dead of

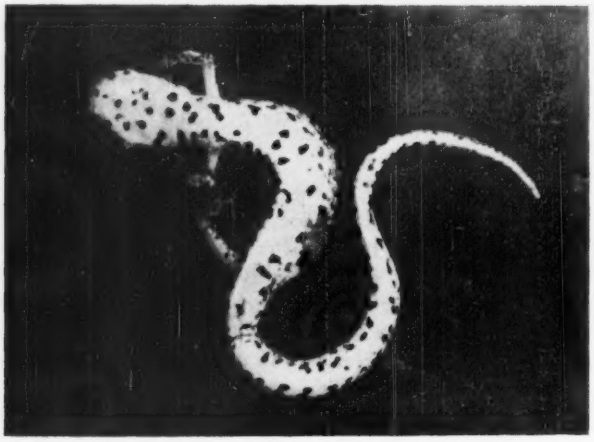
At the left a salamander enthusiast collects larvae of these amphibians in a typical coastal plain pond, and, right, James A. Fowler, Director of Education at the Philadelphia Academy of Natural Sciences, in the process of acquiring a hellbender.





The red-back salamander, *Plethodon cinereus*, has two color phases, the red-backed at the left and the gray at the right. Its average length is three inches. This salamander clings upside down to the bottom of a cavity, as within a decaying log, and deposits its eggs, which hang down like a little bunch of grapes.





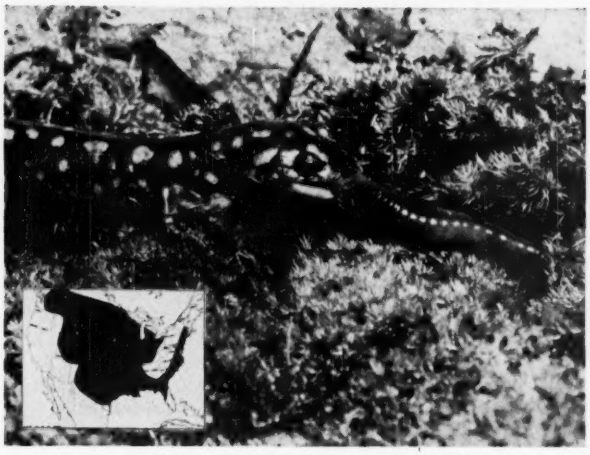
The four-toed salamander, *Hemidactylium scutatum*, frequently found in sphagnum bogs beneath moss, is one of our smallest salamanders, averaging about two and one-half inches. It has four toes on its hind feet, while most of the other salamanders have five. Above, right, is the underside of this creature, the arrow indicating a constriction at the base of the tail, which enables the salamander to "shed" its tail quickly when grasped, thus escaping. In such a case a new tail is generated.

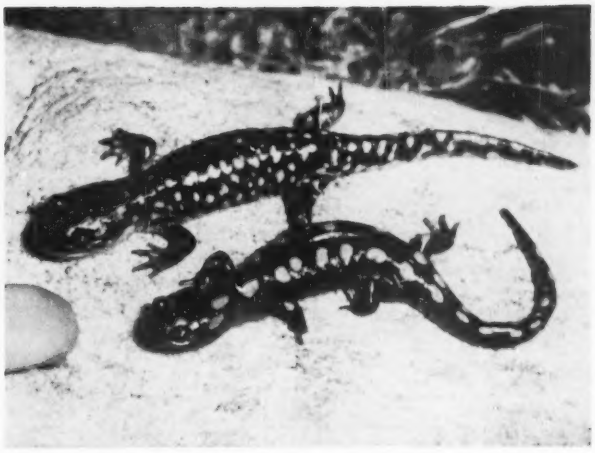
winter, and some will congregate in the breeding pond while ice is still present.

Let us visit a pond where the common spotted salamander, generally characteristic of the whole family, may now be mating on a March night. Put on your boots and take out your flashlight, but do not turn it on until we are at the water's edge. Near a submerged branch, there may be at least twenty-five male and female "spotteds." Bright yellow dots on a chocolate background are a rather spectacular color combination for such a secretive animal. Note how they occasionally swim to the surface to take in air. Look at them undulating round and round in a circle, swimming over and under one another, vigorously rubbing and nosing together. This activity is the "nuptial dance." A male breaks away from the circle, a female following him. He grasps a submerged twig with his hind legs; with a slight quiver arches his back, deposits the spermatophore. This is a vase-shaped mass, about three-fourths of an inch in height, of turbid jelly containing the sperm. The male may deposit as many as forty spermatophores that drop to the pond bottom. The female swims up to one of these spermatophores which are lying on the bottom and straddles it, fertilizing her eggs, which she may take an hour to deposit on some object just below the surface of the water. This tapioca-like egg mass may contain two hundred eggs. These will grow in size and hatch in about six weeks.

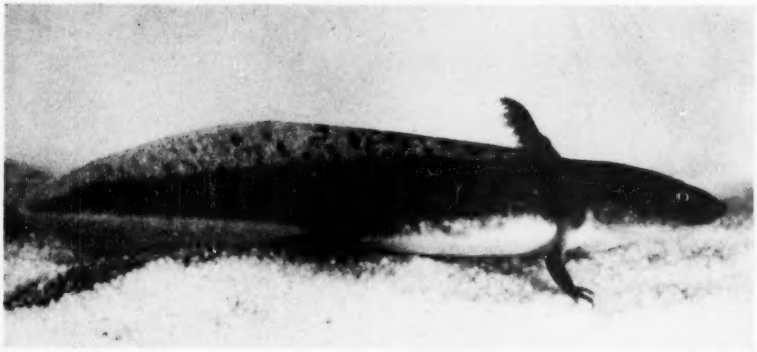
The tiny larvae are tempting morsels to fishes, crayfishes, turtles, waterfowl, snakes and water beetles. Those that survive will grow from one-half to two and one-fourth inches over a period of three months. Then they will lose their gills and leave the water, to utilize the lungs that have replaced them. These juveniles gradually acquire the color scheme of the adult. Within a year they will have grown to three and one-half inches, and in two years, after transformation, they will have attained physical and sexual maturity.

During the daylight hours the salamander usually re-





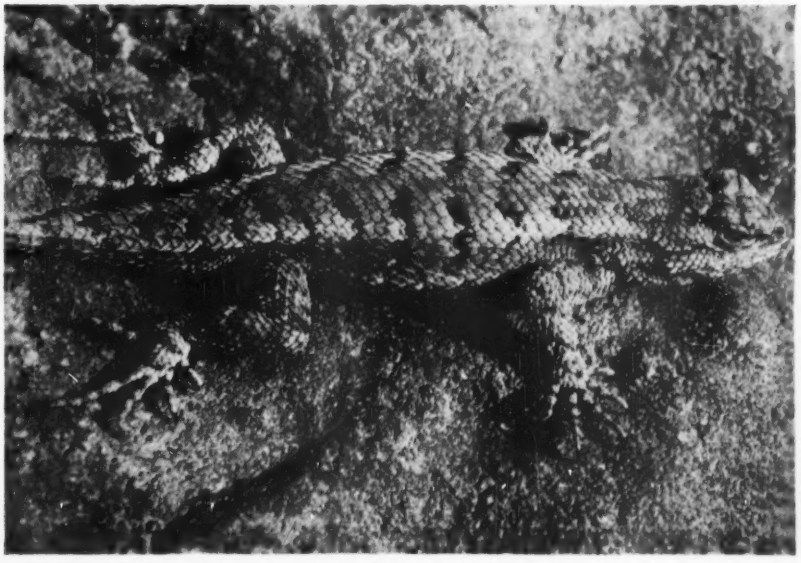
The tiger salamander, *Ambystoma tigrinum*, munches on an earthworm, a frequent item on its menu. This species may move to the breeding pond while ice is still on the pond, if in the northern part of its range. Because of its burrowing habit it is frequently observed only during the breeding period. Young tiger salamanders are often confused with spotted salamanders, as is suggested in the picture at the right, above, the tiger salamander, whose spots are irregular and extend on to the sides, being in the rear of the two. This amphibian averages seven or eight inches in length, and may be thirteen inches long.



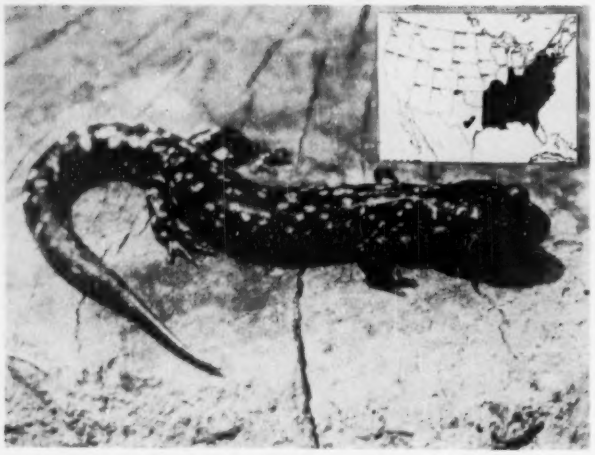
In the western United States the tiger salamander reaches maturity in the larval stage; never loses its gills or leaves the water. In this form it is called axolotl, and it occurs in the so-called "goiter belt", where the iodine content of the soil is low. The lack of iodine is believed to affect the thyroid gland of this creature and prevent its transformation. Injection of thyroid material will cause it to lose its gills and complete transformation. Some axolotls may be in excess of a foot long.

mains in hiding beneath logs or stones in clearings and open woods, roving about at night feeding on earthworms, ground beetles, insect larvae, crickets, and even other salamanders. With cold weather, the salamander retreats to a subterranean nook until spring comes.

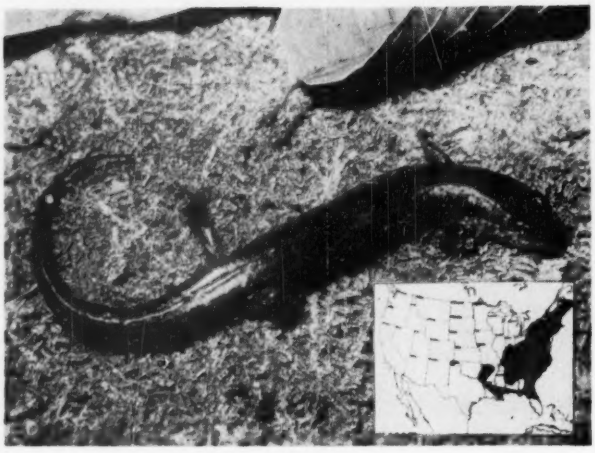
When afield do not neglect these little woodland sprites. Take a few minutes to search in suitable locations and you will be rewarded by securing a collection of some of Nature's most intriguing creatures, the salamanders — tailed relatives of the frogs and toads.



Northern fence lizard, *Sceloporus undulatus*, Salamanders are often mistaken for lizards, but, as the photograph shows, lizards have scales and more than four digits on the front feet. They also possess claws. Salamanders, in contrast, are smooth skinned with no more than four toes on the front feet and do not have claws.

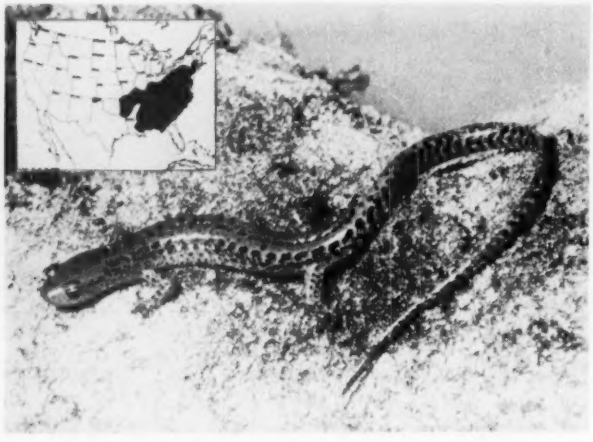


The slimy salamander, *Plethodon glutinosis*, averages about six inches in length and is one of the larger lungless salamanders. It derives its common name from the abundance of sticky slime that it produces when stimulated. Easily found under decaying logs on wooded hillsides.

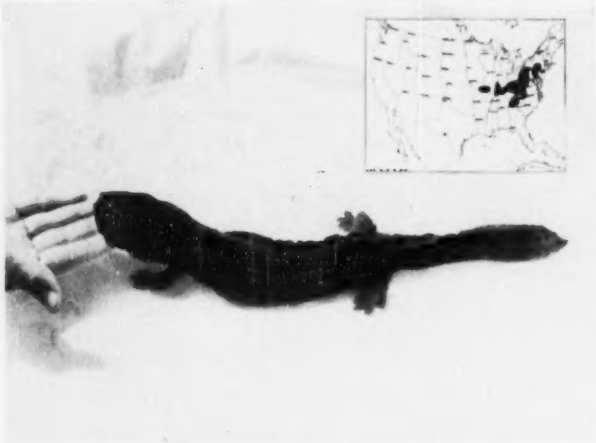


The dusky salamander, *Desmognathus fuscus*, is one of the most common, averaging four inches. It is variable in color and pattern, and can open its mouth only by lifting its head, its lower jaw being immovable. It is a white-peppered deep gray, and lungless. Common under small rocks at stream edges.

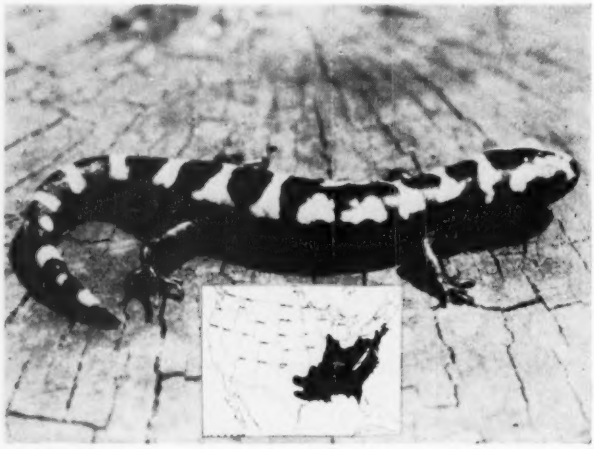
The spotted salamander, *Ambystoma maculatum*, averages seven inches and breeds in spring with the advent of warm rains.



The long-tailed salamander, *Eurycea longicauda*, is one of the most beautiful and is often found in caves. Averages 5 inches.

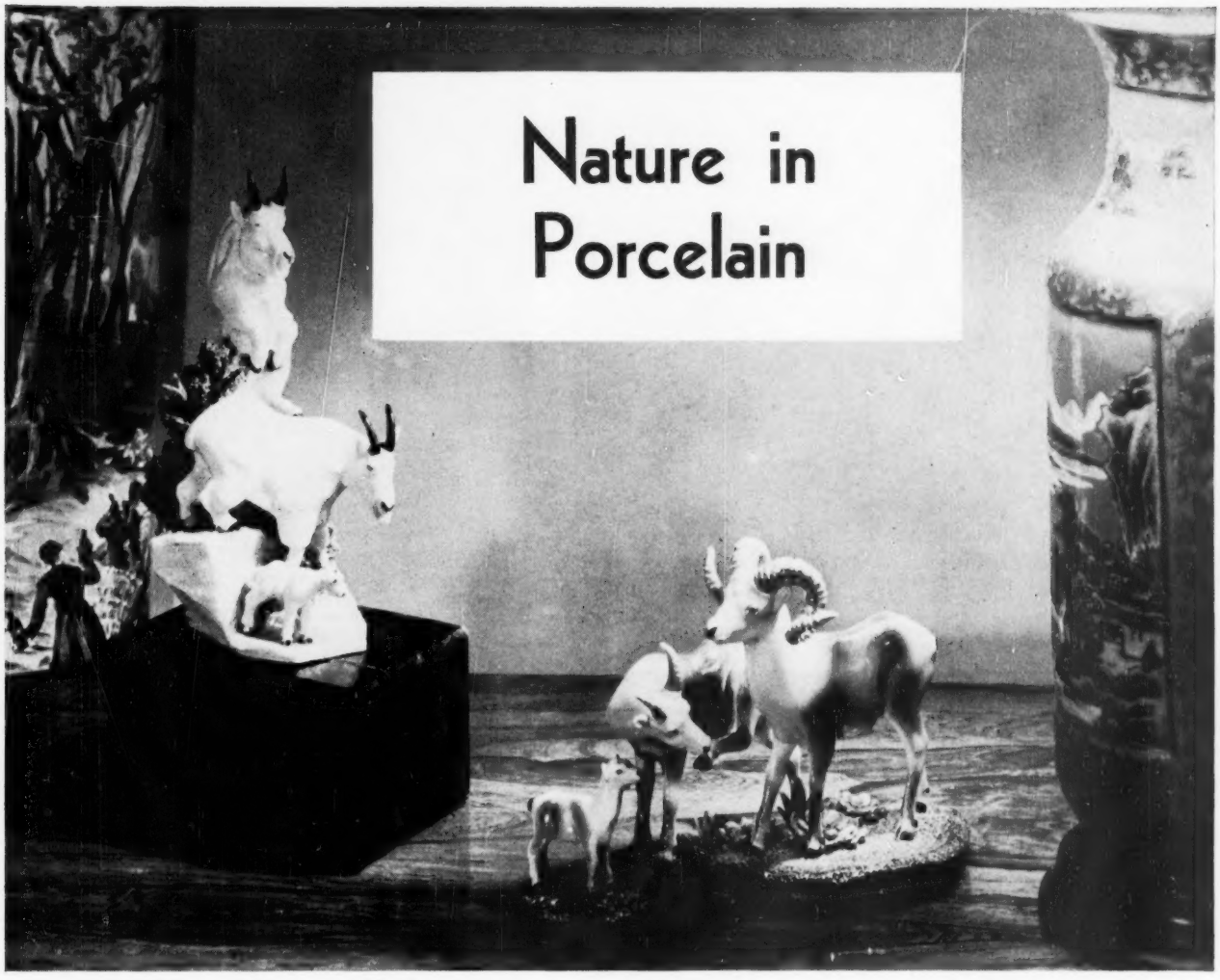


The hellbender, *Cryptobranchus alleganiensis*, probably the ugliest of the salamanders, averages 17 inches. It lives in swift-flowing streams and is the mud-colored North American relative of the Japanese giant salamander. It lives beneath large, flat rocks and forages for food at night. Surprised, it exudes quantities of mucus in attempts to escape.



The marbled salamander, *Ambystoma opacum*, is a strikingly colored, black and white amphibian averaging five inches in length. It breeds in the fall, when it is most numerous. Its eggs are deposited in a place that will be covered with water by the fall rains, the female's ability to select such a spot being a marvel of instinct.

Nature in Porcelain



Rocky mountain goat and mountain sheep groups illustrate the way of life of these animals, goats on the high rocks, sheep on pastures above timberline.

IT WAS an orphaned bunny rabbit that started it all. Frances Poe was a Chicago commercial artist. In connection with animal illustration for an encyclopedia she started a research collection of animal art. Then a special assignment left her with some extra modelling clay. That was where the bunny came in. The left-over clay was put to work to record the progress of the rabbit from a blind, almost hairless waif to a bright-eyed, frisky infant.

The experience with the rabbit led Miss Poe to investigate what could be done in ceramics that would have sales value. She could find no American mammals done by hand work, and, she adds, "I soon found out why. It took all of my spare time, and some I couldn't spare, for five years, turning out one piece a week to make the first salable piece." Experiment followed experiment, because Miss Poe was unable to find that antlered animals had been done before as she sought to do them. She had no one to look to for help except herself.

Finally, in 1949, Miss Poe had succeeded well enough for exhibit at the Chicago Public Library. In connection with this she was the guest of Marlin Perkins on his popular television show from the Lincoln Park Zoo. It was then that Irving Tarrant, appraiser and art connoisseur turned dealer, "discovered" her.

Frances Poe, Mr. Tarrant asserts, is one of America's foremost artists. Through her work many people whose primary interest has been art have become aware of our American fauna. Also, Mr. Tarrant says, "to the best of my knowledge, she is the first and only artist to do the diversified American animals in this difficult medium."

Each subject is modeled individually by hand, with great care and fidelity. With careful skeletal and anatomical accuracy the artist combines a sympathetic understanding of the subjects.

Every worker in ceramics must develop a formula to meet his particular needs. Miss Poe finally found answers to her problems, including the special problem of rendering North American mammals in porcelain in such a way as to support heavy bodies on light legs in the intricate process of production.

The output is one group a week, less a 40 percent firing loss, or about thirty pieces a year. The rough mass is built, hollowed out and put back together. Then it is carved to the finished form. Colors, derived from metallic

Mule deer buck and doe with two fawns. Miss Poe's collection includes all of the large North American mammals. She has adopted this geographical limitation in order to give her subjects serious study.

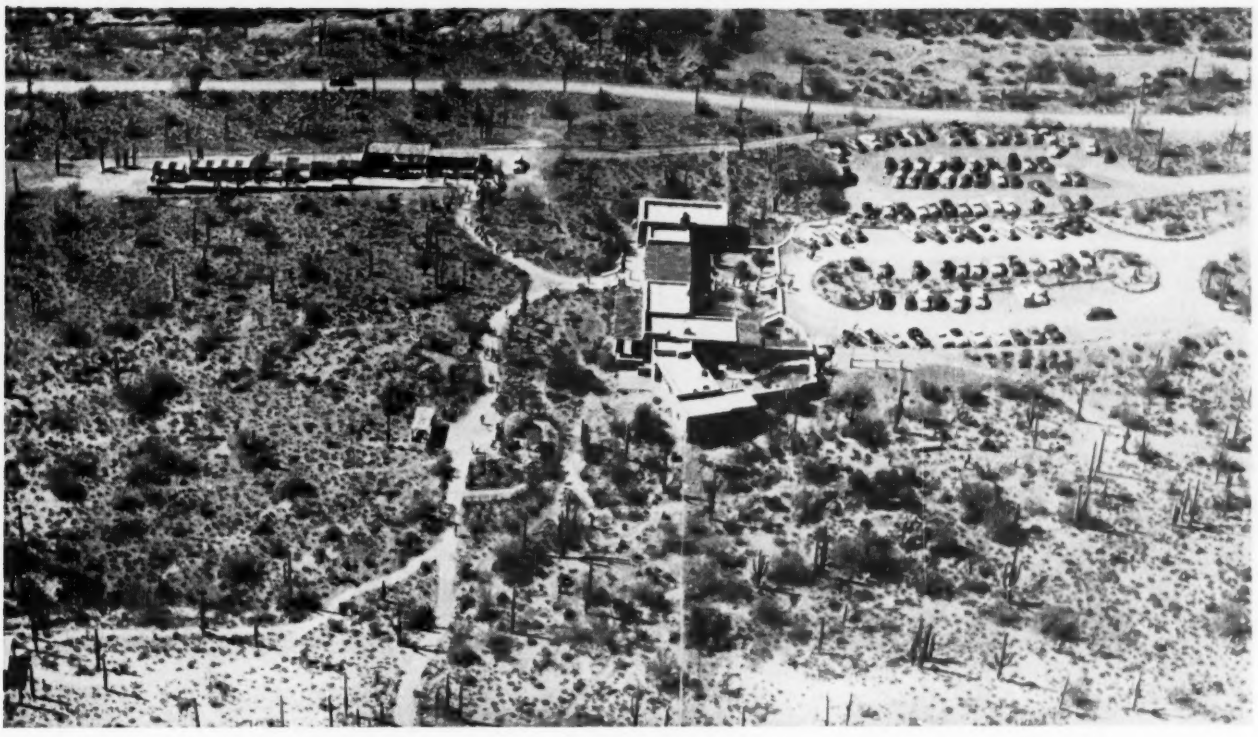
A woodland caribou subject. Adding a new animal to the collection is like a musician adding a new composition to his repertoire. Following skeletal measurements, detailed drawings are made as a basis.

Miss Poe in her garden with one of her favorite friends. Below is a mother black bear and two cubs, who seem to cherish some doubts about association with a pair of skunks. Humor appears in many of Miss Poe's creations.

oxides, are limited by high temperatures to yellow, orange, brown, black, green and blue. Great precaution must be taken in placing the subjects in the kiln. Each creation being different, each can be expected to have a new little trick of its own, which must be anticipated in firing. Antlers often warp and must be corrected by refiring. A piece may be fired many times before it is perfect, the highest temperature being 2300 degrees F. If one member of a group is lost it is difficult to fit in a new animal.

The porcelains here shown indicate, so far as pictures can do so, how Miss Poe has succeeded in creating subjects of real beauty; art and Nature objects truly entitled to be called unique.

Another mule deer subject. Once such a subject is decided upon, the original conception must be memorized because modeling time is limited by the drying rate of the clay. It is then too late to make changes in design.



Air view of the American Nature Association sponsored Arizona-Sonora Trailside Museum near Tucson. Upper, left, are the animal pits, with the main museum buildings in the center. In the foreground are the Nature trails. More than 130,000 people have visited the museum since it was opened on Labor Day, 1952.

Gem of the Desert

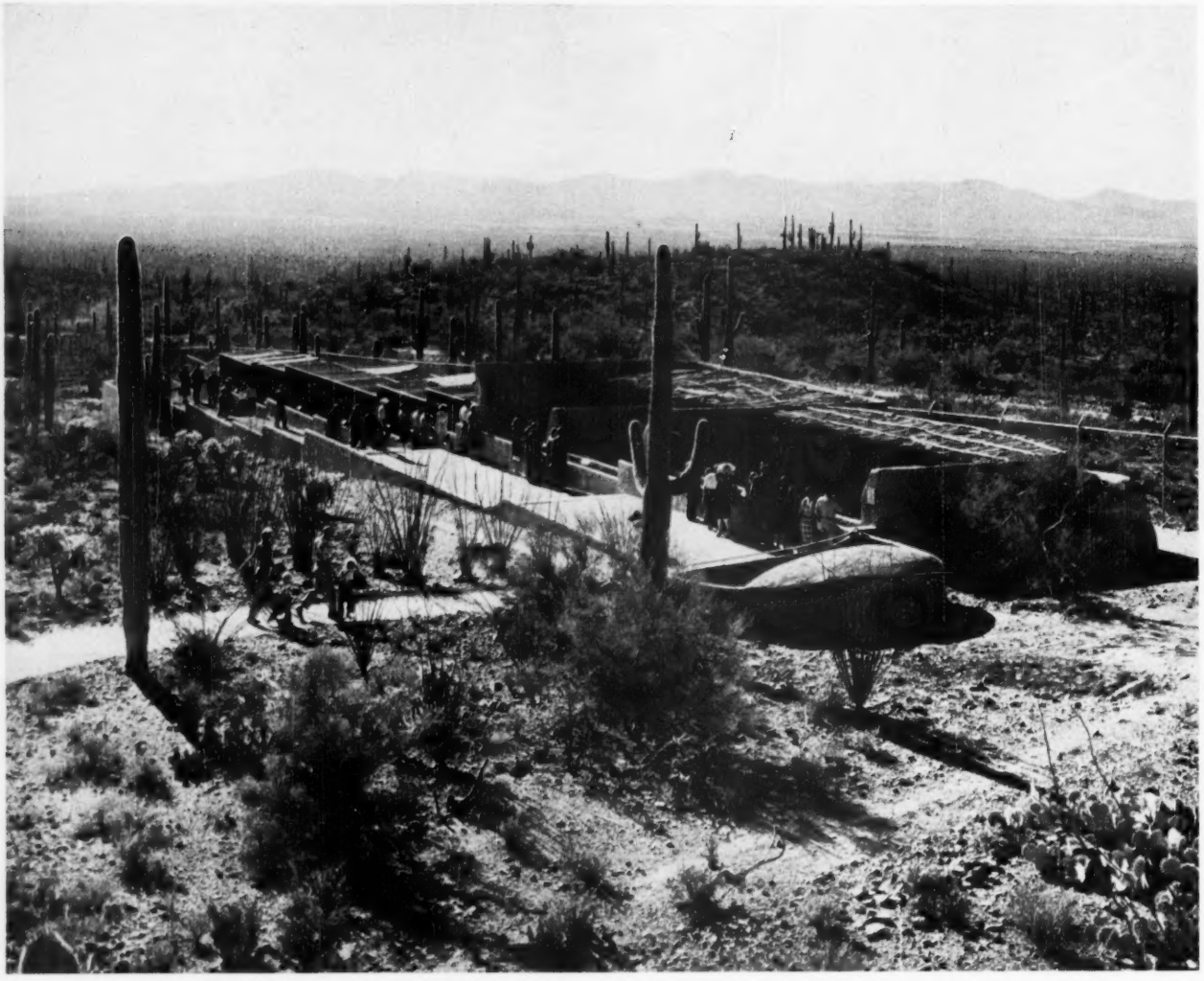
By WILLIAM H. CARR

FEW educational projects have proved their worth so quickly as has the Arizona-Sonora Desert Trailside Museum. Started in April, 1952, opened to the public on Labor Day, the museum, fourteen miles from Tucson, attracted more than 130,000 visitors during its first seven months. Many school classes have visited the museum.

Arthur Newton Pack, president emeritus of the American Nature Association, was the originator of the project. With funds from the Charles Lathrop Pack Foundation, expended under the sponsorship of the American Nature Association, and with the active cooperation of the Pima County Park Committee, the museum became a reality through hard work and a clear vision of its goal.

Today this project is a dramatic presentation of desert life in this area. Representative larger animals are comfortably housed in outdoor enclosures. A small animal room displays other forms of wildlife found in southern Arizona and northern Sonora, Mexico. Outdoors there are Nature trails and exhibits of the flora of this region.

Mother javelina, or peccary, and her twin youngsters. They were born at the Trailside Museum, but the mother, who was ailing, has since died. The youngsters are in the best of health.



Animal pits and enclosures for native animal life. Starting with the javelina pit at the right, there are enclosures for mountain lion, bobcat, coati mundi, raccoon, coyote, gray fox, ocelot, skunks and ringtailed cats.

One of the main objectives of the project is wildlife and other resource conservation. Development of the museum as an educational force calls for exhibits and dioramas that will relate all renewable natural resources of soil, water, plant life and animal life. Already the need has been demonstrated for expansion of the museum facilities.

To that end the Arizona-Sonora Desert Trailside Museum Association has been formed. Its officers are Arthur N. Pack, president; Roy Chapman Andrews, vice-president; Joseph Wood Krutch, secretary-treasurer; Mrs. H. H. d'Autremont, Mrs. R. E. Ellinwood and George W. Chambers, directors. This Association has as its goal making the museum a show window of the geology, botany and zoology of this desert area. An endowment will be raised to permit expansion and the completion of a well-rounded presentation. Having proved its value, and demonstrated the extent of public interest, the museum should have no difficulty in achieving perpetuity through public support.

At the organization meeting of the Museum Association, naturalist-explorer Andrews declared that "it is enormously important to the Southwest, and to the entire country as well, to share this venture with Mexico. Here is a unique opportunity to study desert life of reptiles, birds and mammals in the extraordinary environment in which they live. It is fascinating to study these creatures that have adapted themselves to a land without water."

The former director of the American Museum of Natural History said that most museums start with a few plans and many sheets of paper, but this one is already established and has a head start. He pointed out that it has proved its value by the visitors it has attracted. This has been accomplished despite the fact that "the museum project has had no organized publicity and the museum is stuck out on the desert. Yet it has caught the public interest in amazing fashion. Now that the museum is a going concern the task is to make it bigger and better; to make it a pillar of Nature education about the desert."

Careers and Conservation

DURING the past twenty years conservation of renewable natural resources has made steady progress. This period of time has seen the development of a wider appreciation of the interrelationships of soil, forests, waters and wildlife. There has also been crystallized a quite clear basic policy for administration of these renewable resources. While it still remains for this policy to be applied wholly, thinking on this subject has been in tune with the past two decades of advance.

These conservation gains have not been achieved without much effort, both positive and defensive, by conservationists. Positive effort has resulted in wide application of policies of wildlife management, furtherance of the philosophy of wilderness preservation, extension of the national park and monument program, real assault on the twin problems of soil erosion and stream pollution, and strengthening of the national forest program. Defensive effort has been necessary when special exploitative interest, either private or governmental, have sought to undermine the program.

Although this conservation progress has taken place largely during a Democratic Administration, it has not been a partisan program. Politically speaking, there are certainly as many Republican conservationists as there are Democratic conservationists. And the seedling of the conservation tree was planted during days of Republican control, dating back principally to Theodore Roosevelt, Gifford Pinchot, Stephen Mather and others. That the tree should have achieved important growth in the past few years has been due to the conservation-minded rather than to the politically minded.

During this past score or more years, therefore, it has become a habit to think of the administrators of our forest, wildlife, park and soil conservation programs as career men. They are men with scientific background, long associated with the agencies they were finally selected to head. One rarely thinks of how these men vote, if, indeed, they vote at all, some of them being disenfranchised residents of the District of Columbia.

It is only natural, therefore, that it should come as a bit of a shock to learn that one or more of the "career conservationists" has been removed for reasons that are patently political. We have come to think of conservation policy as something that is non-partisan.

Recently Douglas McKay, Secretary of the Interior, announced that Albert M. Day, director of the U.S. Fish and Wildlife Service for the past seven years and with the Interior Department since 1918, was being replaced. His removal was announced to be because his position is "policy-making." It is, of course, for it makes policy with respect to regulations under which migratory birds are shot, exercises control over certain commercial fisheries, and is otherwise concerned with maintenance of various wildlife resources. It is, consequently, natural to wonder whether removal of Mr. Day presages relaxing restrictions in such manner that they will please duck hunters, commercial fishery interests, or others. The deposed director has suggested publicly that he has made enemies among duck hunters and salmon canning interests, which are delighted to see him out of office.

We have no quarrel with the Secretary's desire to place in this position of responsibility an individual in whom he has personal confidence. He has chosen John L. Farley of Seattle, Washington. Mr. Farley's intimate relationship to wildlife conservation appears to be confined to service as executive director of the California Division of Fish and Game, from 1929 to 1935. He is a graduate electrical engineer, although his work has been largely public relations with Crown Zellerbach Corporation, pulp and paper manufacturers, except for several years of military service. We understand that the new director has maintained an interest in wildlife conservation, although there is no indication as to just what his views may be with respect to it. For that matter, there is as yet no very clear picture of what Secretary McKay thinks about wildlife.

Until the pattern becomes more apparent, we can only hope that we are not soon to face wildlife conservation policies, or other conservation policies, based upon selfish pressures rather than scientific evidence. Of course, there is the possibility that there may be better administration and stronger policies, including less glorification of predator control. Mr. Day has, in our opinion, given a competent and generally courageous administration of resources about which there is often controversy. There are other trained men who could do as well, or better. Perhaps Mr. Farley is such a man. We certainly will give him the benefit of the doubt.

However, until there emerges some clear picture of the Administration's conservation views with respect to public lands, and the natural resources now administered by the government, we will continue to lack confidence in the future. And the uncertainties that now seem to surround those who have chosen the public service in the conservation field as a career will continue to disturb us.

The Goulds—

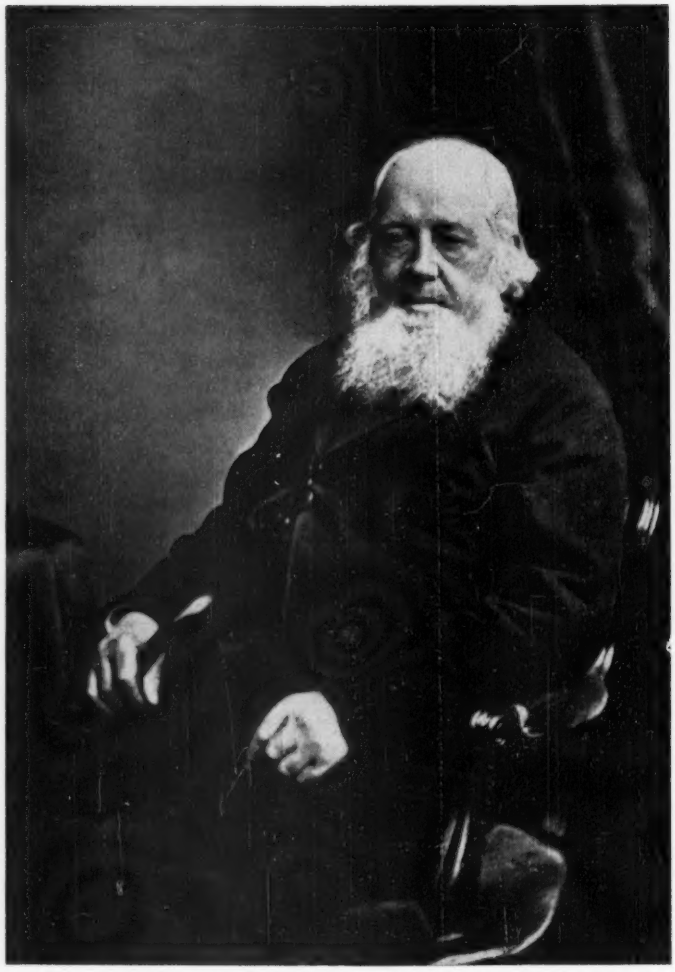
Olympian Bird Artists

By ROMEO MANSUETI

THE Centenary of John James Audubon's death was observed by school children and newswise city editors alike with a sincerity rarely accorded a comparable figure. Few Americans, however, even among Audubon's staunchest admirers, have heard of his English counterpart. At the same time the bronzed "American Woodsman" was soliciting subscriptions for his art, a man and wife were painting beautiful and exotic birds, sometimes American species, in London, England.

John Gould, and his wife Elizabeth, now occupy an exalted position as bird painters in Europe comparable to that of Audubon in America. Their work, notwithstanding, is not well-known in bird and art worlds in the United States. Yet their framed pictures occupy a chosen place in many American homes, and they are frequently seen on the walls of living rooms in Hollywood movie sets.

To John Gould must go most of the credit for initiating the stream of highly colorful bird books that electrified contemporary ornithologists and artists, although Elizabeth Gould probably influenced him more than any other person. When only a teen-aged boy, Gould established a reputation as a skillful taxidermist. After mounting birds, he must have felt dissatisfied at their imperfect attitudes, for he soon developed an obsession for sketching birds in action.



When this portrait was made in 1875, John Gould, at the age of 71 years, diligently sketched the plates for the *"Birds of New Guinea and the Adjacent Papuan Islands."*

With advice from bird students, Gould developed a technique of realistic sketching, and ultimately guided others in a style of objective painting that completely revolutionized natural history illustration. His sympathetic and almost compassionate pictorial treatment of every bird was immediately transmitted to his associates. But for his early life and associations, and particularly the fortuitous meeting with Miss Elizabeth Coxen, a pretty young lady studying fine art and painting, he might have remained just a mediocre artist and good naturalist.

Gould was born at Lyme, in Dorsetshire, England, on September 14, 1804. His parents, both interested in the outdoors, helped to instill in him a love of Nature. His earliest association with Nature came in 1818 when his father received an appointment to the Royal Gardens at Windsor Castle. There the boy assisted his father in gardening, and later slyly recalled how he "picked many a bunch of dandelions for Queen Charlotte's tea."

He formed an early acquaintance with British birds, at the same time developing a ready knowledge of botany from his father and J. T. Aiton, his father's superior at the Royal Gardens. His bird enthusiasms were soon dampened when he was sent to Ripley Castle under the care of the gardener to study forcing, the science of cultivating plants by artificial means. He soon tired of this, and, in 1827, went to London, where his career in ornithology soon began.

Gould must have been an extraordinary youth, for he obtained appointment at the famed Zoological Society of London as "Superintendent" of the ornithological collections. His singular energy, cheerful disposition, and youthful exuberance helped him, and, at 25, he had no peer as a taxidermist. His close friends called him affectionately the "man-of-all-work," while others, perhaps prompted by jealousy, chose to refer to him simply as the "bird stuffer."

Gould received much encouragement from the eminent British ornithologist, N. A. Vigors, but he soon

realized that his bride-to-be, Miss Coxen, could enhance his whole artistic outlook in bird study. They were married in 1829.

Mrs. Gould herself was an excellent artist. This probably spurred Gould's ambition to illustrate all the known birds. They set to work together on their first major contribution, *Century of Birds from the Himalaya Mountains*. Before beginning the actual work for this gargantuan task, John, realizing his wife's artistic powers, broached the subject to her. "But who will do the plates on stone?" she asked, for stone lithography demanded great skill. "Who?" replied her husband. "Why, *you* of course!" Gould began to sketch birds, turning over the results to his wife, who patiently etched them on stone for reproduction, a feat often requiring more talent than that possessed by the original artist. Gould made his drawings from the valuable collection of bird skins from the Himalayas, while Sir William Jardine often advised him and criticized the illustrations for their life-like appearances and proportions. Mrs. Gould also was a severe critic of her husband's work.

The care that the Gould family bestowed on the plates and their coloring was remarkable, their object being to create artistic pictures of birds and mammals in their natural habitats. Mrs. Gould painstakingly etched the impression of the bird on soft stone with a sharp-pointed stylus. A mistake often required that the whole stone be thrown away, or that a section be replaced. Needless to say this labor required a detailed and accurate impression of each bird. The reproductions show that she etched each species with exceptional clarity, often improving on her husband's drawings.

The Papuan bird of paradise, *Paradisea minor minor*, is considered one of the most lush, colorful bird portraits ever prepared by Gould and W. Hart. The bird's lively action typifies the new technique which shoved the old, stilted Victorian style of bird illustration to the background.

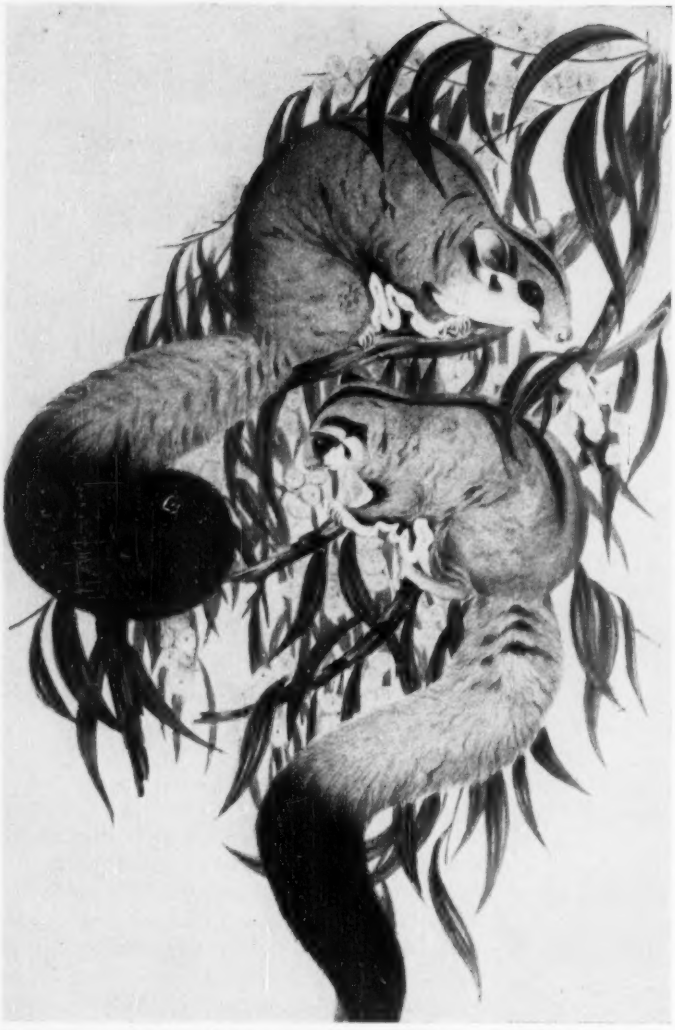
The book was a quick success. No such clever drawings had been seen in England, with the exception of Bewick's woodcuts and the beautiful illustrations by Swainson. Most earlier bird illustrations were in a quaint style, showing rather artificial stances. Gould was hailed widely as a promising ornithologist. Vigors, who prepared the technical descriptions of birds of the Himalayas, was probably instrumental in helping Gould to become a Fellow of the Linnaean Society, a great honor for one not formally educated as a scientist.

By this time Gould had left the Zoological Society and had purchased a house on Broad Street, Golden Square. Here the young couple prepared illustrations from the many bird skins strewn on tables. Mrs. Gould labored long upon the lithographic stones, little knowing that the names of herself and her husband would become imperishable.

During this period Gould, was unable to obtain a publisher for his first illustrated work and reluctantly resolved to become his own publisher. His works subsequently became a financial success, realizing a considerable fortune for himself. European royalty and the nobility of England, in addition to the most prominent ornithologists of the world, clamored for his books after viewing the first few volumes. It became quite fashionable to possess the complete set of Gould's elephantine folios.

With the completion of the *Century*, Gould seemed to have been so far encouraged by the success of his first undertaking as to have begun the publication of several more folio works, the most important of which was his *Birds of Europe*. Assisted by his wife in the drawing of the plates, which were 449 in number, he published the whole five volumes between 1832 and 1837.

The energy with which the Goulds worked during the eight years from 1830 to 1838 may be gauged by the long lists of works produced at that time. Not-



The squirrel-like flying opossum, *Petaurus sciureus*, was drawn in 1863 by Gould and lithographed by H. C. Richter, showing that Gould and Co. were equally proficient at producing illustrations for the *Mammals of Australia*, as they were for the birds of that region.

withstanding this, they found time to visit the principal museums of Europe. Gould struck up a lasting friendship with Temminck, director of the Leyden Museum. This renowned Dutch zoologist allowed him to figure many of the rare birds that the museum possessed, knowing the artist's love for dealing with novelties. Gould's passion for naming and illustrating birds new to science bordered on the unscrupulous, since he often attempted, sometimes with great finesse, to beat his colleagues at describing new species. He strictly followed, however, the zoological rules of nomenclature.

The choice of English names for the exotic birds seemed to have been more or less a stumbling block to Gould, as it is to many zoologists today, and several amusing mistakes have been revealed by the late Richard Bowdler Sharpe, the brilliant ornithologist of the British Museum of Natural History. He compiled a complete list of all the plates that Gould published, and arranged an analytical index to them in response to many queries from British gentry possessing complete sets of the artist's works. Sharpe stated that Gould generally extricated himself from difficulty by repeating the Latin name. Thus, *Amydrus tristrami* became Tristram's Amydrus. But in the manufacture of English titles for some of the species of hummingbirds, some curious names, such as Aurelia's Puff-leg, resulted.

Gould was far more than an "armchair" bird-artist. The works on Australian birds and mammals were largely the result of a voyage he and his wife undertook in 1838 and 1840 with an assistant, John Gilbert. Gould visited and explored many parts of the continent and adjacent islands, and revelled in the rich conglomeration of color in the tropical birds that flew about him. He acquired rich stores of novelties, and the accounts that he wrote of habits of some of the species were of remarkable interest. Today, Australians regard him as the "Father of Australian Ornithology." In 1938, the *Emu*, a quarterly magazine devoted to the popularization of Australian birds, issued the Gould Centennial Number, commemorating his visit, in which they discussed his travels and associations of more than a century past.

In 1841 Gould was dealt a terrifying blow. His wife and guiding light died suddenly. About the same time his collectors in Australia lost their lives — Gilbert, speared by natives during Leichhardt's expedition in 1844, Drummond in Western Australia, and a third on one of the islands of Boss's Straits. Soon afterward most of Gould's sketches were transferred on stone by W. C. Hart, considered one of the most talented artists of that period.

Gould did not become a recluse after his wife's death. He regularly attended meetings of the various scientific societies, becoming president of the Zoological Society. Still more remarkable was his election, at a comparatively early date, as a Fellow of the Royal Society, the greatest honor that can be conferred upon a scientific worker. Fellowships were rarely given to zoologists.

The delicate beauty and lush colors of the illustrations in the *Monograph of the Humming Birds* made his next undertaking an easy success. Gould's drawings were exhibited during the Great Exhibition of 1851 in the gardens of the Zoological Society, where he was allowed to erect a building. The majority of the hummingbirds and illustrations were drawn upon stone by Richter from sketches by Gould. The birds are still preserved in the British Museum of Natural History. Oddly enough, Gould saw his first live hummingbird in its native state one pleasant day in Philadelphia in

the company of W. L. Bailey.

Soon after Gould's Himalayan masterpiece and the massive *Birds of Europe*, he published such ornithological tomes as *Monograph of the Family Ramphastidae; or Toucans*, *The Trogonidae; or Family of Trogons*, and *Macropodidae; or Kangaroos*. In addition, he industriously published ponderous treatises on the birds of Australia, New Guinea, Great Britain, and other areas. He produced magnificently illustrated folios on the partridges of America, hummingbirds, and ant-thrushes. The *Mammals of Australia* is a classic, but perhaps his greatest work is *Monograph of the Paradisidae; or Birds of Paradise*, with 80 hand-colored plates. Count Tommaso A. Salvadori, the erudite Italian ornithologist of the late 19th century, who was considered a critical connoisseur of bird art, admired these paintings above all others. Many ornithologists consider the *Birds of New Guinea and the Adjacent Papuan Islands* as Gould's most handsome and artistic creation. One thing is certain — few bird painters can hope to duplicate this five-volume work in a lifetime. All the works were characterized by graceful and dignified prose. Gould's secretary, C. H. Prince, was believed to be largely responsible for the highly readable text, and probably functioned as a strict editor over his employer's writing.

In his lifetime Gould produced 50 folio volumes, measuring almost a yard in height, and illustrated by more than 3000 hand-colored plates, a wonderful achievement for one man. This constituted an average of more than one plate for each week of his fifty years of working life. Gould also contributed about 300 memoirs and papers to scientific journals.

The plate of the elegant pitta, *Pitta elegans concinna*, is unique for the inclusion of the European newt in the beak of a New Guinean bird. Apparently Gould did not know that salamanders do not exist in the Indo-Australian Archipelago. The illustration was lithographed by W. Hart in 1875.

Neville W. Cayley, a distinguished Australian bird artist, has outlined the evolution of a plate from start to finish. Almost every illustration was made from a rough pencil design, which often possessed far more character than the finished drawing. Dr. Herbert Friedmann of the Division of Birds, United States National Museum, possesses an excellent example of a skillfully drafted pencil sketch. From their sketches the Goulds made finished water-color drawings, then redrew or engraved them on lithographic stones, either by transfers or tracings, or direct by hand. Often they copied or engraved direct, without the aid of a finished painting. Prints or engravings were then made from the stones on good quality hand-made paper by hand-pressed printing machines, the prints being black and white complete with every detail and graduation of values of an etching or pen and ink drawing. These were then hand-colored and became replicas of the artists' water-color painting, from which they were copied and the plate made. When no "original" existed, a specimen of bird was used for correct coloration. This was an expensive process, but by far the finest and most sumptuous known method of reproduction by color.

Gould was an indefatigable collector, employing several other good collectors and taxidermists to supplement his own huge collection of skins. His Australian mammals, numbering more than 5000 skins, and his collection of hummingbirds, were secured for the British Museum of Natural History, the birds for $12,000, an unheard of sum in those days for bird skins.

A blow to British pride occurred when Gould's collection of Australian birds, containing many types, was purchased by an American, after it had been offered to and turned down by the British Museum of Natural History, for the ridiculously low sum of $4000. Mr. Edward Wilson obtained the skins for his brother, Dr. T. B. Wilson, who later (Continued on page 332)

Road to the Top of the World

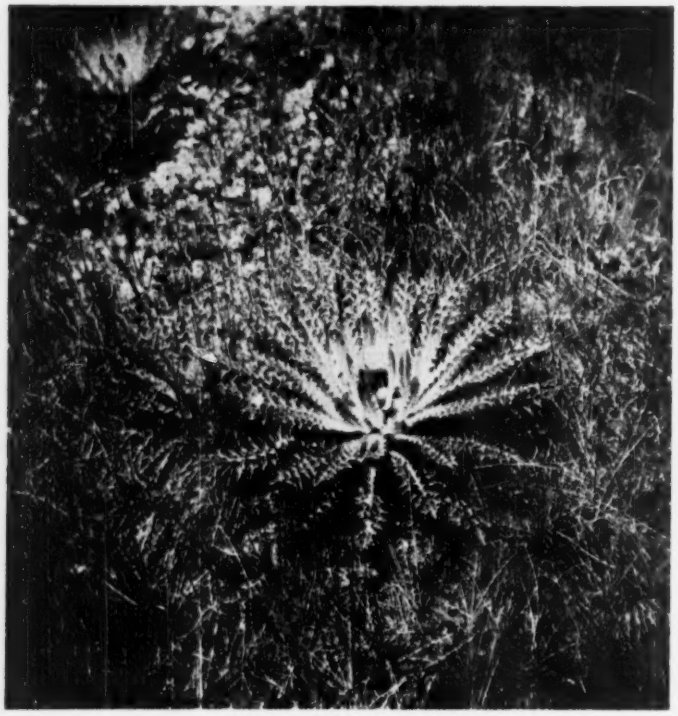
By VIRGINIA S. EIFERT

Photographs by the Author

Fall River, fed by snowfields high among the peaks, dashes in bright cascades through a forest of Douglas fir in the upper Montane Zone.

OUT OF the valley Joel Estes found in 1859, out of the forests of yellow pine and Colorado spruce, away from the flower meadows along Fall River, Trail Ridge Road rises to the bleak and windy summits. This remarkable highway, highest continuous road in America, travels through Rocky Mountain National Park from an altitude of 7500 feet, in Estes Park Village, to the craggy rocks standing 12,183 feet above sea-level.

Between these heights and changing with altitude, dwells life characteristic of mountains. For every thousand feet in altitude, it is as if life zones moved a thousand miles toward the Arctic. Vertically, in a few miles, one may seem to traverse several thousand miles in latitude, for in country like this changes in plant and animal life come in rapid succession. In an hour, or less, on Trail Ridge Road, a modern motor car may climb from the mountain-rimmed valley that was the pride of the Utes and Arapahoes, and follow the old Indian trail to the emptiness of high-mountain zones. On those heights live plants and animals related to those of the Arctic.



As the road travels westward out of Estes Park Village, Fall River gallops alongside; it is cold, even in midsummer, because it is fed by melting snows on mountain peaks. At an altitude lying between seven and eight thousand feet, the trees of the montane zone are predominantly Colorado blue spruce, aspen, and western yellow pine, the magnificent orange-barked pine with its glittering needles and tight, spiny cones. Among the pines argue the ultramarine Steller jays; sometimes there are magpies. There is the busy talk of moun-

Elk thistle, *Cirsium drummondii acaulescens*, grows in great spiny rosettes among the grasses and flowers of Horseshoe Park.

Wind-beaten Engelmann spruce stands starkly above the road. This is one of the tortured trees of timberline along Trail Ridge Road.

tain chickadees, pygmy nuthatches, and Arkansas goldfinches, the startling Indian-colors of Williamson's sapsucker and the western tanager. In aspen groves the mule deer quietly graze, and a bull elk, early in the morning, may lift his great head and placidly watch the scant sunrise traffic on the road. The dusky grouse nests among the Indian paintbrush flowers; harebells, yellow buckwheat, and the large lavender daisies of *Erigeron* blossom in the sunshine. Golden-mantled ground squirrels live among the rocks and are familiar with handouts around cabins in the valley. And along the tumbling cascades of Fall River dips and teeters the gray water ouzel.

When the road passes the ranger station on Fall River Road, one of the official entrances to Rocky Mountain National Park, the pavement climbs abruptly up and around an aspen meadow to a sudden height of 8500 feet, where Douglas fir spires stand tall along Fall River.

In dashing white rapids the river tumbles out of Cascade Lake, but west of the lake the river is a placid stream meandering through a flowery meadow. It is a meadow set with the great spiny rosettes of elk thistle, bright blue pentstemons, mariposa lilies, and purple harebells. Along the stream sing Lincoln sparrows. The broad-tailed hummingbird makes a great to-do catching gnats over the water. Tracks of deer prick the shore mud.

Always beyond rise the high peaks. The great mass that is the Mummy Range curves westward, bright in the morning sun, decorated with clouds at noonday, dark under storm, illuminated with sunset. Long's Peak, standing 14,255, dominates every view to the south.

At the head of this mountain meadow — Horseshoe Park — lies little Sheep Lake, named for the Rocky Mountain bighorns that come in numbers in autumn, and sometimes even in midsummer, to graze and drink with deer and elk in the valley.

From Horseshoe Park, Trail Ridge Road rises through aspens and blue columbines to Deer Ridge at 9500 feet — Deer Ridge with its shining pines and the big gray and white Clark's nutcrackers, which sit about in them or fly into the picnic ground for snacks. The road climbs above Deer Ridge, then dips into Hidden Valley where beaver dams lie across smooth, mirrored ponds. At the valley's end the highway rises again in sudden S-curves past a great forest of Douglas firs whose tapering spires climb almost to timberline. Among these shadowy trees grow blue chiming bells and the white, fragrant stars of one-flowered pyrola.

The air changes. It is colder, thinner, and more

Snow buttercups, *Ranunculus adoneus*, like shimmering yellow poppies, blossom close to the edge of snow.

exciting as the road passes across the upper part of the big forest where the Douglas firs merge with the Engelmann spruce and alpine fir of the subalpine zone. Two miles above sea-level, Rainbow Point looks down three thousand feet into Joel Estes' valley, where mountains and streams are laid out as on a relief map. At the Point, Clark's nutcrackers and big gray Canada jays come down to feed. Tiny western chipmunks flirt their tails and boldly take food from visitors' hands. A cony barks among the tumbled rocks below and busily gathers grass for its hay piles.

Beyond this spot the aspect changes again. Vanished are the green trees, the protection of forest rising on either hand. Wind-beaten limber pines and Engelmann spruces stand starkly above the road. Many of these were burned long ago. They and the living trees are one-sided, and twisted, their bark actually turned spirally under the incessant wrenching of high-altitude winds. Dead trees that have lost their bark show how the grain of the wood is twisted around the body of the tree.

These are the tortured trees of timberline. Some are erect but are shorn of all branches on the northwest side, some lie almost prostrate, yet live and bear fruit. Some are dwarfed; they form an elfin forest of spruces that may be very old, yet never attain more than two or three feet of stature. And when the last of the elfin forest trees are left behind, a vast openness, bleak, splashed with cloud-shadow or immersed in sudden mist or rain from low clouds, again bathed in sunlight, lies ahead.

Golden-mantled ground squirrels take food from hikers' hands and pose nicely for pictures.

The intimacy and strangeness of little Iceberg Lake, below the road, is only a brief interlude in the contemplation of great size and space. Yet, although from a swiftly moving car the landscape may appear barren and cold and somehow frightening, it is not barren, not colorless or wholly grim. The mysterious grandeur of the high places is here, and there are some of the most delicate, colorful, and sturdy flowers in the world. With them are high-country birds and mammals.

The highest point on Trail Ridge Road comes at 12,183 feet. Beyond lie the stark, blue-black mass of the Never Summer Range, Long's Peak pale blue in the distance, and wheat plains sixty miles to the east, yet this may not be the most interesting spot on Trail Ridge Road. A few miles farther at a slight drop in altitude lies Fall River Pass. From here, Trail Ridge Road descends into forest again, enroute to Grand Lake. At Fall River Pass there is one of the finest opportunities in America to explore the meaning of mountains and elfin forests.

Above the shelter house, with its restaurant, museum, and perpetual snowdrifts, rises the actual top of the mountain, up which a trail of the bighorn sheep cuts through a vast sub-alpine flower garden. These plants are compact, almost stemless; they hug the gritty, stony skull of the mountain. But many of the flowers, in proportion to the size of the plants, are large. The alpine sunflower, *Rydbergia*, in early July holds pairs and trios of three-inch sunflowers mounted on white-woolly stems only two or three inches tall — the mountaintop is like a sunflower-patch buried to its neck in rock! Among the bits of glittering white mica and pink quartz there are the bright pink moss campion, blue alpine phlox, white *Arenaria*, yellow avens, tiny alpine lilies, the little pink stars of pygmy *Lewisia*, white *Talinum*, red king's crown, dwarf yellow paintbrush. Beside an alpine pool grows *Elephantella*, and around the cairn of rocks, where hoary marmots live, there are four-inch chiming bells of deep blue, and, in August, the Arctic gentian. These are all compact and bright, amazingly tough and enduring to exist in the stern world of the sub-alpine. They come into bloom as soon as the late snows of the mountain tops recede enough in June and early July for the wet earth to give forth its flowers. Out they burst — gold-satin snow buttercups at the edge of the drifts, white marsh marigolds with their roots in snow-water, lemon-yellow globe flowers in icy mud.

Now in the clear air of the top of the world there is a thin singing that might be of the wind but is not. High against the clouds — much higher than the mountain top — hangs a bird on beating wings, a horned lark singing a tinkling song. The nest is hidden among rocks and flowers. Another, a slim brown bird, springs up, higher, higher, singing a wild and rapturous song — the American pipit. With the larks, it nests in the sub-alpine. Few birds live here — the lark, the pipit, the white-tailed ptarmigan, the rosy finch, the white-crowned sparrow, the pileolated warbler, peering bright-eyed from an aged spruce tree eighteen inches tall at

A mountainside of alpine sunflower, *Rydbergia*, at Fall River Pass.

the very edge of the sub-alpine, ravens and golden eagles on the crags.

Mammals, too, are few. There are the big hoary marmots; the mountain sheep roaming over the flowery meadows; the conies in the rock slides.

As a golden eagle coasts down an air current and the shadow of wings crosses the rock slide, from the rocks there comes a sharp "ka-a-ack!" At the signal there is a queer chorus of little barks among the rocks; the conies are telling their young to lie low until the danger is past. Among the broken rocks sit the brown conies, their defiant noses in the air, heads thrown back, large round ears held close, little bunny-like bodies hunched, guardians of the rock slides in the high country.

This is the top of the world, a world reached by means of a smooth highway that rises through several life zones of the Rocky Mountains. A huge world is spread below. Dozens of mountain peaks rise more than eleven thousand feet high. Clouds build up mightily against a deep sapphire sky. Everything seems big and awe-inspiring, and cars seem beetle-like as they creep along the high roads.

But, like man's own dwarfing in the presence of so much majesty, there are many small, reassuring things. Mountains are a land of contrasts. On a twelve-thousand foot peak there may grow an alpine lily whose hair-fine stem is an inch long, with four tiny, thready leaves set precisely upon it, topped with a fragrant miniature "Easter" lily a half-inch wide. On the tremendous mountain carved hugely by ancient glaciers, an eight-inch cony defies with shrill barks the onslaughts of eagles. Mountain sheep descend casually over the most precipitous rocks. There is the sky-flight of a lark, singing in the sweet bright sunshine. And there is the roaring, blue-black storm cloud, which, even in mid-July, sweeps blinding snow in a smother across the flower gardens of the heights, across the caverns of the marmots, across the rock slide of the conies, across the eagle's wings, and lays new, six-sided, fluffy flakes on ancient snow that never, from year to year, entirely melts. These indeed are some of the contrasts held in the high country, the key to which is Trail Ridge Road, rising from the bright pines of Estes Park to the high-held mysteries of the heights.

When June Comes In

By ELISE LEIDHEISER GIBBS

When June comes in a boy goes out
To run and wade and climb and shout,
To scuffle dust, to jump, to wind
A forest path, to dig, to find,
To touch, to smell, to pocket things,
To learn the ways of fins and wings,
To slide, to swing, to get the feel
Of height and speed with kite and wheel.

And suppers grow cold as the wanderer cleans,
Slicks back a cowlick, and changes his jeans,
And some parents scold, but the ones who are wise
Look not at the knuckles but into the eyes
To catch a glimmer of the swift high joy,
The summer splendor of being a boy.

Bluegills at Lake Lucy

By CHARLOTTE A. DuBOIS

Illustrated by Virginia S. Eifert

ON THE Fourth of July my companion and I started on a little jaunt that took us to Lake Lucy, some eighteen miles west of Minneapolis where, on earlier trips, we were always expecting to find something we had never seen before. Leaving the car on the blacktop, we walked down the old road which, after three-quarters of a mile, ends at the lake. As we strolled along, we heard an eastern meadowlark singing in the adjoining field of alfalfa. Although I know of no better way to start or end a day than listening to the song of the eastern bird, my companion informed me he preferred the deeper, richer tones of the western meadowlark.

Grass heads swayed against our own. A small garter snake wriggled with Fourth of July languor into the grasses from the wheel rut, just in time to avoid a man-sized boot. At the top of the rise, swallows flew out of holes in the cut of sandy clay at our left. They swooped high and low over our heads, always with such rapidity that it was hard to tell whether we were seeing the duskiness of the rough-winged's throat, or the dark breast band of the bank swallow.

Presently the old roadway became a causeway through the marsh. Here, Joe-Pye weed was coming into the full magenta of its bloom. And, nearby, a small moth folded its powder-blue wings against the soft lavender of a milkweed. Yellow discs of wild lettuce could only nod their heads, while goldfinches set their undulating flight to music. The alder that bore a goldfinch's nest, last year, this year bore only leaves. Charming friends, all of these; but old friends, not new!

Only a few red-winged blackbirds gave warning of our presence. And now, as usual, short-billed marsh wrens sang from the margin of the marsh. Yellow-throats sang "tee-witchity" and "witchy-tee," as though trying to make us believe in witch's tea.

At the end of the causeway, where the road enters the woods, a seven-branched candelabra of wood lilies blazed bright orange, lighting our way into the woods. How dependable a hostess Nature is! Although our human friends may neglect to hang a wreath of evergreen on the door at Christmas time, or otherwise fail to observe the advent of the seasons, Nature rarely fails to welcome us with wood lilies on the Fourth of July, or, in autumn, to suffocate us with joy by her daily repainting of the landscape colors.

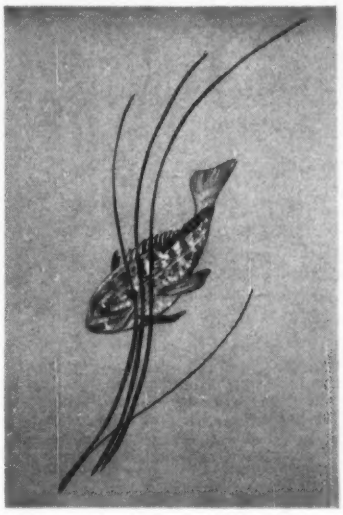
The white violets, now past blooming, hid the ground with foliage wherever the sugar maple seedlings left them room. Although the tasty leaf buds of the basswood trees were not yet plump enough to have their full sweetness, they were as satisfying as ever. There was an abundance of prickly ash. But, thankful for having no toothache to burn out, in legendary fashion, with this shrub's fiery berry, we were well content with the aromatic fragrance of a crushed leaf stem.

Up the slope to our left, chickadees pronounced not their own name, this time, but the phoebe's, with more deliberation and musical skill, however, than the phoebe is able to employ. And from the deep woods an ovenbird called "teacher-*teacher*-TEACHER" with as much persistence as an eager school boy who knows his lesson. We stopped to listen. Man somehow feels akin to those creatures in Nature whose utterances approximate words, while he stands in awe and wonderment at such inimitable sounds as a winter wren's tinkling warble from some lonely mountain nesting place.

We did not stop long, however, to listen to any song. Something, whether anticipation or mosquitoes, drove us on until, as suddenly as we had come into the woods, we came out again, now to the grassy shore of Lake Lucy. This is always a delight in itself, and, somehow, always a surprise. But it did not satisfy us today.

We felt instinctively that something new, something unusual, something especially interesting, was to be our reward that day. So, still looking and listening, we walked down to the water's edge.

A sugar maple leaned over the water, and nearby an ash all but plunged into the lake. Between them, and a couple of feet offshore, a boy's raft lay afloat. Cattails and arrowhead added interest to the scene, but were no surprise, nor was the blue flag blooming at the water's edge. Dragonflies darted low over the water, on whose surface a strider skated. And there was enough water milfoil to supply all the neighbors' goldfish bowls.



With as much Fourth of July languor as the garter snake, I had lain, face down, on the trunk of the reclining ash, while my companion stood looking on. After a moment we noticed motion beneath the quiet surface of the water, motion that abruptly subsided in pools of sunshine. "Fish!" I cried, and jumped up. The fishes fled. We barely had time to see there were two of them, before they disappeared under the raft, to reappear, just as suddenly, a moment later.

Darting out into the sunshine again, they went straight to two small pools hollowed out of the lake bottom, close to the shore, and about five feet apart. In contrast to the muddy covering of the rest of the lake bottom, the pools were paved with clean sand, colorfully studded with large and small pebbles.

The pools, about a foot in diameter, were circular at the rim, and remarkably symmetrical, each slanting gradually towards the bottom, like a bird bath. Each pool — as measurements later showed — was hollowed out two and one-half to three inches *below* the lake bed, while its rim was built up an inch *above* the lake bed. Thus the rim of each was about eight inches below the water level.

Upon returning to its own pool, each fish would energetically fan the bottom with its lower fins, stirring up the sand until the water was murky. Or, by violent jerks of the caudal fin, it would dislodge various materials from the bottom of the pool. One fish thus moved a soaked, brown oak leaf farther up the side, and sent a snail shell scurrying several inches away. A live snail clung to a bit of water milfoil that hung over the pool, and together these were swayed in the roiled water.

After working less than a minute, both fishes darted off, under the raft, only to return in as great a rush, and resume work on their spawning bed — for that was what we were viewing. Had we not seen the fishes at work, it would have been hard to believe that such well-rounded bowls, with their symmetrical rims, could have been shaped by creatures with neither hands nor feet, wings nor bills.

The fishes, themselves, we saw when the water cleared, and during repeated observations, were about six inches long, with an overall blue cast, with aqua about the mouth. The eyes were like jewels; like bits of onyx circled with gold and mounted in a red setting. The fins and ear lobes were margined with gold. They were sun fishes.

Since the male of all species of sunfishes is said to form the nest, and since the nest-shaping activities were still in progress here, we surmised that our fishes were males who had yet to attract females to their domain. After the females had accepted mates and laid the eggs, they would be relieved of all further domestic responsibility, leaving it to the males.

When we returned to the spot, ten days later, one nest was completely leveled over and deserted. The other nest was still discernible, but somewhat distorted and littered with lake-bottom material. However, a sunfish was on duty there, coming and going as rapidly as before, but limiting his nest activities to gentle fanning.

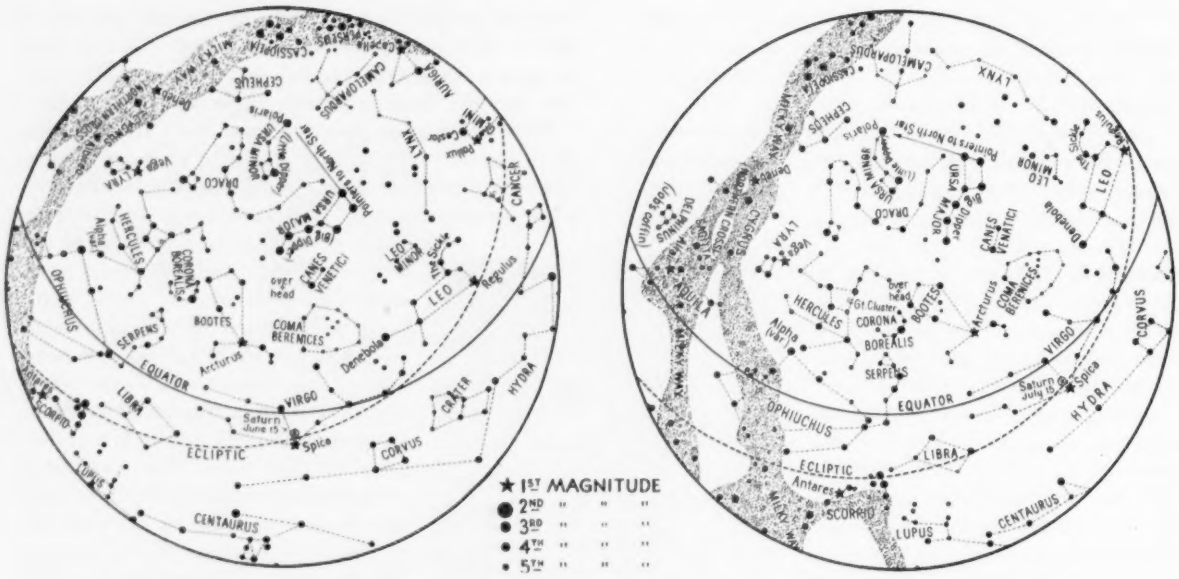
Eight minnows swam about, sometimes over the nest. Although sunfish eggs now doubtless adhered to the pebbly nest material in the bottom of the pool, the bluegill showed no distrust of the school of small fishes, but continued alert in his quiet guarding of the nest.

Our find had been a new experience, even for my companion. For me, it was a highlight of the summer.

Redbud Magic

By MAUDE WOODS PLESSINGER

The redbud flames against the greening hills.
And like a butterfly in dark cocoon,
That bursts its prison walls along in June,
The leaves are coming forth. The swollen rills
Are challenging their banks, and sunlight spills
Through cracks in an old barn on dusty hay
And tints with gold old fields that roll away
From where an old farm house with rotting sills
Sleeps by the remnants of a fence. Once love
And laughter throve beneath its oaken beams,
And tears, and there were fondly cherished dreams.
Now when the sky is pansy blue above
And it is May and redbud magic spills
Across the land, I hie me to the hills.



9 P.M., June 1; 8 P.M., June 15.

9 P.M., July 1; 8 P.M., July 15.

To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then, below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south.

The Evening Sky in June and July

By ISABEL M. LEWIS

IN OBSERVING the heavens during these two months, with the aid of the star charts, one must keep in mind — if one is using Daylight Saving Time — that the star charts are for Standard Time, or one hour earlier than the clock indicates. For example, not until ten o'clock in the evening, Daylight Time, will one see the heavens as they appear at nine o'clock on the star charts for these two months.

In June and July, in the evening hours, the Big Dipper lies either across the meridian, high above the pole, or a little to the northwest of it. Cassiopeia, which in winter months was occupying this favorable position in the evening sky, now far north below the pole, is in the less favorable position. These two constellations, always diametrically across the pole from each other, and about equally distant from it, never pass completely below the horizon but swing around the pole above the horizon, either wholly or in part, at all hours and all times of year, in northern latitudes.

Through its two Pointers in the bowl, the Big Dipper serves not only to indicate the position of Polaris, the North Star, but also, if one follows the direction of the handle southward for a distance about equal to the extent of the Dipper itself, one will come to one of the finest and brightest stars in the heavens, Arcturus, in the kite-shaped constellation of Bootes, The Herdsman. This constellation will be conspicuously visible throughout the summer, and far into the fall, in the evening skies. Arcturus is reddish-yellow in color and is a star of zero magnitude; that is, about 2½ times brighter than a star of first magnitude, which is approximately the magnitude of Spica, in Virgo, or Antares, in Scorpio. Arcturus is almost exactly equal in brightness to Capella, in Auriga, which is one of the finest stars in northern winter skies, or the magnificent Vega, in Lyra, which is so conspicuous in summer and autumn skies.

Vega appears in the northeast in the spring as Capella sinks below the northwestern horizon. Vega, Arcturus, and Antares, in Scorpio, are the most beautiful stars visible in summer skies in the evening hours. Arcturus is one of our nearer neighbors among the brightest stars. It takes about 33 years for its light to reach the earth, traveling about 186,300 miles per second. Vega is an even closer neighbor, at a distance of about 23 light years. Antares, one of the greatest in size of the red giant stars, has a diameter estimated to be more than 300 times that of our own sun, great enough to extend across the orbit of Mars. Its distance from the earth is about 250 light years, with an uncertainty of around 20 percent. Scorpio is one of the finest constellations in the heavens, seen to the best advantage in the early part of July, when it will be found nearly due south in our latitudes. It has, in addition to its first magnitude, red giant star, Antares, a number of

brilliant second and third magnitude stars, which outline the tail of the Scorpion, which it is supposed to represent, extending in a long, curved line to or below the southern horizon. It is in the tropical regions that Scorpio is seen in its greatest splendor, lying as it does in a brilliant portion of the Milky Way. Within the tropics it does not lie near the horizon but passes high overhead.

In the evening sky in June and July the Milky Way lies along, or not far above, the eastern horizon; and one looks in the direction of Coma Berenices, Canis Venatici, below the handle of the Big Dipper, and Virgo, toward the north pole of the Galaxy and surrounding regions of the celestial sphere. Here, instead of looking through regions densely packed with stars, luminous and dark, galactic nebulas, and the great open star clusters that abound along the plane of the Milky Way, and within ten degrees or so to either side of it, one looks out with the aid of the most powerful telescopes to clusters of extragalactic systems, many of them similar in form and extent to our own galaxy or Milky Way system, which is spiral in form, flattened and of great extent. Nearest of all these clusters of exterior systems is the cluster in Virgo with several hundred members. This covers an area about ten degrees in extent, and is at a distance from our galactic system of about seven million light years. There is a cluster in Coma Berenices, within about three degrees of the north pole of the Galaxy, that has about 800 members. A cluster in Corona Borealis has about 400 known members in an area equal to that covered by the full moon. Within the bowl of the Big Dipper is the Ursa Major cluster, with more than 300 members so far discovered. With the aid of the 200-inch Hale Telescope on Palomar Mountain, a statistical survey of these far exterior systems of stars and nebulas is now under way. The faintest of these systems photographed are at distances of more than half a billion light years. Red shifts in the lines of the spectra of these exterior systems have been observed, increasing with distance, and may indicate that the universe is expanding. Again, the reddish color of these far distant objects may be due to the existence of cosmic dust in considerable quantities.

It is now believed that there exists in space as much interstellar matter as is to be found existing in the stars as luminous bodies and in various types of clusters and nebulas. It is in these early summer evening skies in the direction of the north galactic pole, where we look farthest into space far beyond our own system, that the greatest of telescopes is now exploring regions unknown a decade ago.

Among the planets during these two months Mercury will not be visible, although in the evening sky up to the time of inferior conjunction with the sun on July 25, except for a week or so preceding and following the date of its greatest eastern elongation on June 27, when it is farthest east of the sun. It may then be found in the evening twilight low in the west just after sunset. After the first week in July Mercury will be drawing in, too near to the sun to be seen. At inferior conjunction on July 25 it will pass to the morning sky. Venus is a morning star, a brilliant object low in the east early in June, rising an hour or more before the sun at the beginning of June. Its distance from the sun will increase steadily until, on June 22, it is at greatest western elongation, farthest west of the sun, and rises more than two hours before the sun, and is a brilliant Morning Star. During July it will continue to be the most conspicuous and beautiful object, visible for about three hours before sunrise in the east. During this period it will pass from Aries into Taurus.

The Planet Jupiter

By DANIEL SMYTHE

A bright ambassador ascends
As pale light ever narrows down.
We see what darkness soon suspends —
A star for its enlarging crown.

Here is a breathless point revealed:
It knows no storms, or ocean's arc.
To some vast system it is sealed
In firm agreement with the dark.

Mars is in the constellation of Gemini in this period, and too close to the sun to be seen. At conjunction with the sun on July 8 it will pass from the evening to the morning sky. Mars is now in the farthest part of its orbit from the earth. Its distance from the earth at time of conjunction on July 8 is more than 244 million miles, as compared with about 35 million miles at a close opposition of the planet, the nearest it comes to the earth.

Jupiter is in Taurus in June and July, and too near the sun in the eastern sky before sunrise to be seen until after the middle of June. By the end of July it is visible for several hours before sunrise and is second only to Venus in brightness.

Saturn remains in Virgo just north of Spica. It is the only planet observable in the evening sky during these two months except for the brief period when Mercury may be found in the twilight late in June and early in July. In June, Saturn will be found near the meridian at sunset. It will be visible in the southwest in July for several hours after sunset. Saturn is almost exactly equal to a star of first magnitude during these two months, and is pale yellow in color in contrast to Spica, to which it is so near at this time. Spica is a white star with a bluish tinge and slightly less brilliant than Saturn at this time.

On June 21, at exactly noon, Eastern Standard Time, the sun will be farthest north of the equator in the constellation of Gemini. At that time it enters the Sign of Cancer, and summer begins in the northern hemisphere and winter in the southern hemisphere.

In July there will be two eclipses, a partial eclipse of the sun on July 10-11, magnitude of the greatest eclipse only two-tenths of the sun's diameter at a point in the Hudson Bay area; and a total eclipse of the moon on July 26, invisible at Washing- (Continued on page 330)

The School Page

By E. LAURENCE PALMER

Professor Emeritus of Nature and Science Education, Cornell University, and Director of Nature Education, The American Nature Association

OPERATION ASPIRIN

NOT LONG ago I heard a university professor claim that he never would accept the responsibility of guiding more than one graduate student at a time. I know of another who used to boast that he was adviser for more than one hundred. Federal funds are available for helping some colleges, with the stipulation that the classes be small, the number varying with the situation. I have heard high school teachers bemoan the fact that they had classes of thirty and forty, and elementary teachers that similar classes prevented them from doing adequate work. Summer camps often limit their enrollment in the interest of effectiveness. Communities limit the number of families that may live in a house, and the number of houses that may be built on a block, and clubs limit the size of their membership. All of this has a bearing on our subject this month.

If you complain about a class of thirty, how would you like to have a class of 50,000? I expect to have the job this summer of doing an instruction job with 50,000 juveniles and 10,000 adults. None of these will be required to be in attendance, and, fortunately, I will not have to look over any papers. The real challenge lies in the fact that the opportunity to carry on effective mass education is such that it cannot be ignored. This is true in spite of the fact that the experience will undoubtedly give me a headache, a malady which the advertisements tell us can be satisfactorily combatted by the use of aspirin. There are plenty of people who let themselves get into situations that they know will give them headaches, and yet they repeat the performance many times. While I know I am heading for trouble I still am glad that I have the opportunity, between July 14 and July 23, 1953, to direct a conservation program for 50,000 Boy Scouts and 10,000 adult leaders at their Jamboree at Santa Ana, California. By edict from the powers that be there are to be no mass lectures, there is to be no instruction under a roof of any sort, there is to be no paid staff engaged for the occasion, and no commercial advertising in connection with the exhibit. Movies are out for many reasons, and most of the standard sensory aids on which a classroom teacher frequently relies will not be suitable under the circumstances. What would you do under these conditions? Think about it for awhile and you may need a few aspirins.

The Site. The Jamboree will be held on a bare, ravine-cut area lying close to the Pacific Ocean near Newport Bay, not far from Long Beach, California. The only plants in evidence by July should be a few low trees in widely separated areas, a few cactuses here and there, and, of course, a few plants in a tidal basin that is not easily accessible to the campers. In spite of this we propose devoting one unit of study to forestry, one to Nature in general, one to wildlife management, one to soil conservation, and possibly one to fishing. Since the site is really a deeply bissected plateau it will be possible for the participants to view a certain ridge from an arc of elevated land that is about 2000 feet from rim to rim. This central ridge will be the main stage on which the conservation program will be developed.

The Staff. The staff working on the conservation program under my direction is sponsored by the United States Forest Service, the Fish and Wildlife Service, the Soil Conservation Service and the Park Service, and their corresponding State units. I will, of course, be representing the non-profit agencies with which I am presently identified. The National Wildlife Federation is underwriting a fellowship grant at Long Beach State College, which will be used to encourage four graduate students whose responsibilities will center around five points of instruction, and they will be assisted by a group of specialists from various fields of conservation. Separate valleys will be dedicated and developed to provide instruction in soil erosion, forestry and wildlife management, and these will be practical laboratories whereby Scouts may make progress in winning merit badges in these particular fields as well as in the general field of Nature.

The Scouts. The Scouts will come from all parts of our country. They will be in camp making their own meals between July 14 and whatever time they leave after the program is finished on July 23. The actual program of activities begins on July 17. They should be in a splendid position to carry back to their home communities the story of conservation as presented to them by our plans. They can be a powerful agency for good if they are properly affected by their Jamboree experience. They will consume 35 miles of frankfurters and 150,000 doughnuts. They will occupy 30,000 tents and operate 5168 kitchens. They will burn 300 tons of charcoal in preparing their meals. There will be one arena available for the mass ceremonies. This will seat 75,000 persons but this will not be used ordinarily in the general activities program of which the conservation offering is a definite part. Some facetious statistician has estimated that the stack of pancakes consumed for a single breakfast would be as high as the Empire State Building in New York, but the influence of the program on the Scouts, and of the Scouts on their home community when they return, cannot be estimated. The 10,000 leaders accompanying the boys will find in the conservation program suggestions as to how the boys may make the most of what they see, on their return to their homes. The National Park Service has already sent a special bulletin to the Scouts attending, calling attention to our national parks, and there will be a representative of the Park Service at Conservation Headquarters on the camp site to provide guidance that will be useful.

The Program. It is not possible at this time to announce the complete conservation program for the Jamboree. Conservation will be given recognition with other activities offered to Scouts desiring to win the awards made at the Jamboree. It is encouraging to find this long overdue recognition being given.

Each day, except on Sunday, there will be regular morning and afternoon hours of instruction. These will be personal to some extent, but there will also be mass instruction based on demonstration of such things as falconry, pigeon racing, fire control, soil erosion by wind or by water, reforestation of denuded hillsides, and so on. It is possible that there may be a demonstration of the herding of sheep by dogs, and of forest fire fighters dropping by parachute at a given spot. At present it seems probable that the pigeons used in the races will be turned over to the boys as gifts. The site itself offers spectacular examples of sheet and gully erosion, with some startling examples of the role of burrowing rodents in affecting soil erosion.

One might question the wisdom of herding all of these Scouts into a limited area for a few days instead of spreading the group out over the interesting terrain to be found within our boundaries. When James West asked some visiting Europeans to comment on what the next step in American scouting might be, he was told that a few sticks of dynamite under all headquarters would be useful. I can still see the expression on his face when he heard it. At the time West was the head of American scouting and much of his philosophy of large units has support. Its merit, it seems, lies largely in training of large units of individuals to live together without losing a sense of individual responsibility. The kids must cook their own meals, prepare and care for their own latrines and get along with their neighbors. There is merit in such training and there is opportunity for unusual mass training.

Going to and from the camp site in California, many of the Scouts will have the opportunity of seeing America for the first time. If they confined their efforts to camping in the back forty of their home farms they would not get this broadening experience. Our modern times require the abandonment of much of the provincialism that was acceptable

in the past. It is possible that the most good may come to those who may have thought that America was bounded by the Hudson River and East River and limited to Manhattan and neighboring villages. At any rate the situation is such that even though I know I am going to develop a headache in seeing it through, I welcome the opportunity. Satisfaction in being identified with such a major responsibility is in itself as good as a dose of aspirin. I am hoping that I may see many readers of *Nature Magazine* at the Jamboree and that I may get many experiences that may be used to enrich this page in the future. Maybe I will not need the aspirin after all.

Bulletins Received

"Ecology and Management of Fisher and Marten in Ontario," a technical bulletin written by Anton de Vos and published by Ontario Department of Lands and Forests. An important contribution to wildlife management. . ."Factors Influencing the Orientation of Migrating Anadromous Fishes," by Gerald B. Collins, is Fishery Bulletin #73 and available from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., for twenty cents. . ."Progress Report for 1952 of Quetico-Superior Wilderness Research Center" by Clifford E. Ahlgren. Available from 919 North Michigan Avenue, Room 2020, Chicago 11, Illinois. . ."Land Capability for Soil and Water Conservation in Oregon" by William W. Hill and W. L. Powers, published jointly by the Oregon Agricultural Experiment Station and the U. S. Soil Conservation Service . . ."One Hundred Years of Engineering Progress with Wood" is available from the Timber Engineering Company 1319 18th Street, N. W. Washington 6, D. C. . . "Children, We Present —" by Golda Sherman Fortin. Light verses about friends of field, air and water, published by The William-Frederick Press, 313 West 35th Street, New York 1, N. Y., for one dollar. . ."The Manitou Experimental Forest" and "The Fraser Experimental Forest," reports on the work and aims of these forests and published as Station Papers 7 and 8 by the Forest Service, U. S. Department of Agriculture, D.C. . . ."The Timber Supply Situation in Florida" by Robert W. Larson is a 60-page report, with end map, is published as Forest Resource Report No. 6 of the U.S. Forest Service, and is available from the Superintendent of Documents, Washington 25, D.C., at seventy cents. . . "Operations without Ether" by A. Godunov is an amusing little compilation of ten do's and don'ts of the garden. Ten cents from the Poplar Press, Altavista, Virginia. . ."Trees against the Wind" is Pacific Northwest Cooperative Extension Publication No. 5 and is available from the Federal Cooperative Extension Service, Oregon State College, Corvallis, Oregon.

Animals and Man

Animals and Man. By G. S. Cansdale. New York. 1953. Frederick A. Praeger. 200 pages. Illustrated. $4.00.

The author of this book is Superintendent of the London Zoo and a lifelong naturalist. He has chosen in this book to discuss the impact of man on the animal life of areas that man has invaded and in which he has established his dominance. The author discusses such varied results of man's association with animals as the reduction of our North American bison herds, introduction of rabbits into Australia, and the extirpation of several mammal species in Britain. The dust cover blurb observes that there are "hardly any" passenger pigeons left in North America, but the author, in his book, makes the extermination of the species official.

Cage Birds

The Care and Training of Home Cage Birds. By Bernard Poe. New York. 1953. G. P. Putnam's Sons. 120 pages. $2.50.

This is a popular and handy little guide that admirably carries out its title. It is calculated to improve the lot of the cage bird, and to answer many questions that arise. Parakeets in particular, but also other cage birds, are becoming increasingly popular.

Physical Concepts

The Nature of Some of Our Physical Concepts. By P. W. Bridgman. New York. 1952. Philosophical Library. 64 pages. $2.75.

This little volume is based upon a series of three lectures delivered at the University of London by the author, who is Professor of Physics at Harvard University. The particular object of these lectures was to distinguish between the "instrumental" and the "paper and pen" component of the operations of the physicist.

Origin and Evolution

The Origin of Life and the Evolution of Living Things. By Olam R. Hyndman, M.D. New York. 1952. Philosophical Library.

In this text the author seeks to explain the origin and evolution of living things on a physico-chemical basis and as expressions of the operation of natural law. It is a book based upon enviromental theory and is in opposition to current teaching that fortuitous mutation is the fundamental mechanism of evolution.

Darling Fellowships

Creation of four grants of $1000 each, to be known as "J.N. (Ding) Darling Fellowships," for advanced training in conservation or research have been announced by the National Wildlife Federation. The 1952 grants went to Long Beach State College of California, Cornell University, Boston University and University of Wyoming.

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Camera Trails

By
EDNA HOFFMAN EVANS

PHOTOGRAPHY, to my way of thinking, is a rather lonesome activity. It is like writing, in many ways. Both callings, whether each be followed for purposes of livelihood, or as a hobby and means of recreation, demand that the photographer or writer spend considerable time alone.

The writer must spend long and solitary hours at his typewriter, and more lonely hours revising and polishing his product. The photographer, too, usually works alone, or with an assistant. He, also, must spend hours in the darkroom, cut off not only from contact with other people, but also from sunlight and the outside world. This similarity is one major reason, I believe, why many writers are photographers, and many photographers are writers. Particularly is this true in the Nature field.

But photographers and writers are not necessarily hermits, recluses, or misanthropes who shun the society of their fellows. While I think it does take a certain amount of self-sufficiency to be either writer or photographer, there is also a real need for companionship and communication with people of similar interests.

For this reason authors have their writers' clubs, conferences, and workshops. True, there are people who talk about writing and never write a word in organizations like these. But, since few people reach old age without feeling the urge to write that "great American novel," this is only to be expected.

For the same reason there are camera clubs, hundreds of them on the local level, as well as those covering a wider scope, on up to the Photographic Society of America, a national organization that includes both clubs and individual members. Many of these clubs hold regular exhibits, assigning specific projects each month, and selecting the best pictures therefrom. The annual exhibit, or salon, is the time when the best prints or slides of the year are chosen.

As another means of getting away from this solitary activity business, some camera clubs also organize outings and field trips, whereby members can work and play together, aiming their cameras at the same subjects but each individual following his own particular bent or technique. It is a fine way for photographers to get acquainted and to observe the other fellows at work. This is one of the places where writers and photographers differ. A group of writers would never gather their typewriters in one place and pound away together. But cameramen can get together and actually take pictures.

This picture, "The Early Birds," by W. Arthur Young of Webster, N.Y., won honorable mention in the Eighth Chicago International Exhibition of Nature Photography.

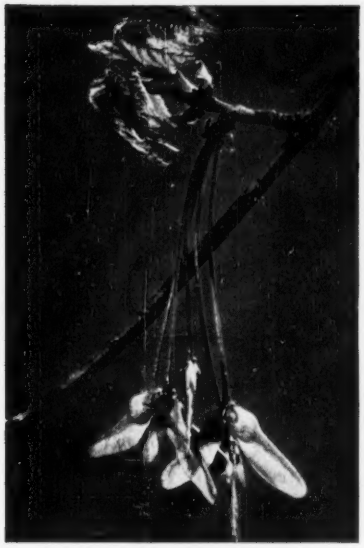
As the local club grows, both in membership and in importance, it may want to expand beyond local limits. It may take over sponsorship of a photographic exhibit in connection with the state fair or some other community project. From there it may expand still further and sponsor an annual international display in which photographers all over the world are invited to participate.

These exhibits, whether on a local or an international basis, are an excellent means whereby photographers can show their work, can study the work of others, and can in the process of competition see how their work compares when judged along with the work of others.

Each salon or exhibition is an individual event; however, some generalization about them is possible. Most of them are conducted according to rules and regulations set up by the P. S. A. (Photographic Society of America). Some are combinations of print and color slide competitions, with the prints being hung for a period of display and the slides being projected at specified times. Some displays are for prints only and some are for slides only.

As a rule, only four entries per category may be made by any one photographer — that is, four prints and/or four slides. Sometimes the entries are unclassified. However, particularly in the specialized exhibits devoted to Nature photography, the photographers are asked to classify their entries into three divisions: 1. botanical or plant life; 2. zoological or animal life (and in Nature exhibits pictures of domestic animals, mounted specimens or museum habitat groups are not acceptable); 3. general, which includes landscapes, seascapes, clouds, astronomy, geology, and the like.

Since there are expenses connected with such an exhibit, the sponsoring organization charges an entry fee — these seem to range from the usual $1.00 per four entries up to $2.00. By no means all entries are accepted for display purposes, and simple acceptance is in itself a considerable honor for the photographer.



This is an interesting shot of a simple subject. It is entitled "Maple Seeds" and was entered by Jack Roche of Caldwell, N.J., in the Eighth Chicago International Exhibition of Nature Photography. This was a color slide.

There are awards for the winners, medals, certificates, ribbons, or similar honors. Rarely — except in the case of contests sponsored by commercial organizations — are there any cash prizes. The prize contests are not the same as in the salons.

Judges for the contests are chosen from among the outstanding personages in photography. Rarely do they belong to the sponsoring club or organization. In selecting the judges, care is taken to get people with wide experience in the pictorial field. So far as the number of judges per contest is concerned, this may range from a single judge up to as many as twelve, although three to five member groups are the most common.

The process of judging is, to the ordinary photographer, a thing of great mystery and wonderment. Particularly does he wonder when his entries are rejected. Why, he wonders. What made the judges reject my pictures and accept some other fellow's?

The process of judging is a fairly well established proceeding, although actual methods may vary. The prints may be viewed by each judge individually, or they may be shown one at a time to the group. If all the judges agree that an entry is good, it is placed in the accepted pile. If the judges disagree, the entry is put aside for second consideration. Entries receiving unanimous rejection are removed from the competition.

After the initial viewing, the entries getting a mixed decision are reconsidered and either accepted or rejected. Finally, both the accepted and the rejected entries are given a second going-over. The photographers are thereafter notified as to the fate of their entries. According to P. S. A. rules, entries must be judged, exhibited, and returned within six weeks of the closing acceptance date.

In submitting prints or slides for competition, it is well for the photographer to keep several different factors in mind. These same factors, incidentally, will probably be the same ones the judges use in making their acceptances and rejections.

To begin with, the picture or slide should have some universality of idea; it should portray character, express a mood; it should "say something." It should have a wide appeal or be strongly arresting. Of course it should have excellent photographic quality; it should be simple enough to carry well when hung or viewed from a distance, and, in the case of a print, it should be mounted tastefully, while the title and signature should be unobtrusive. Above all, these words should be kept in mind as specifications — originality, simplicity, satisfaction, emphasis, emotion, rhythm, composition, and forcefulness.

When and where are salons held? That is a difficult question to answer fully. The chances are there is at least one going on at almost any season of the year. However, the late fall, winter, and early spring seem to be the most popular.

Probably the most complete listing of salon times and places can be obtained from *The Journal*, official publication of the P. S. A. However, once a photographer has submitted entries to a salon, his name goes on an overall mailing list and he automatically receives notices of most of the salons.

The illustrations used this month represent the type of material that was entered in the recent Eighth Chicago International Exhibition of Nature Photography, a joint project of the Chicago Nature Camera Club and the Chicago Natural History Museum.

Statistics from the Chicago club's bulletin indicate the interest taken by photographers in many parts of the world in this particular exhibition. A total of 3413 prints and slides were submitted by photographers in 42 States of the United States, as well as Alaska, Hawaii, the Canal Zone, Egypt, Sweden, Hongkong, Greece, Australia, France, Maylaya, Chile, Italy, Czechoslovakia, India, Scotland, Jugoslavia, South Africa, England, Luxembourg, Canada, Germany, Switzerland, and Spain. Approximately 2000 persons saw the two projections of the accepted slides, while many more thousands viewed the prints that were on display in the block-long main hall of the museum. Certainly, it is an honor and a privilege for a photographer to be able to match his work with such competition and, upon being accepted, to have it seen by so many interested people.

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sented on a monthly basis, and is seeking color transparencies to be used as illustrations. The first category of pictures desired is on "Nature's athletes," showing plant and animal feats of skill and endurance. The second is "Inventions in Nature," showing animal and plant counterparts of man's gadgets and vaunted contraptions.

If you think you might have some color transparencies the publisher might use — only the reproduction rights are wanted — write to C. Earl Cooley at the New York address and ask for specific lists and particulars.

Graflex, Inc., informs me that the publication "Careers for You and Your Camera," from which I quoted in March, is out of print. The material had been in my files for some time and I quoted it because I thought the information it contained was worthwhile. It is too bad that a good publication like that has become unavailable.

MOUNTAIN ABLAZE

(Continued from page 292)

and damage to the forest in the Kaniksu. If only a small part of it could have been appropriated at the beginning of the year! Congress will make good any amount of money required to fight fires *after* they have occurred, but it tries to cut down regular appropriations to the lowest possible point, on an utterly false theory of economy. This summer, fires in the Kaniksu cost $160,000 to suppress and destroyed, by conservative estimate, $300,000 worth of timber and reproduction, making a total loss of $460,000. A quarter of that amount, if set aside as a sinking fund, at 5% interest, would have yielded about $6000 annually. This would be enough to employ 18 additional smoke chasers, etc., each year. Had these 18 men been available this year, there is a strong probability that there would not have been a single serious fire in the forest, instead of 10 or 12.

Practically all of the serious conflagrations this season were lightning fires. It takes a number of hours for such a fire to become dangerous. If, as soon as a strike is reported, a man could be sent to corral the infant fire, virtually no damage would occur. But when there are more strikes than men to attend to them, it is obvious that some must be neglected, and this was the fundamental reason for all but one of the serious fires last summer.

The delay of a day, in getting to the Rode Fire, cost the government about $100,000; instead of requiring one man-day to control it, it took 6000. Instead of burning one acre, it burned 5000. With the resources at hand, this was unavoidable. Every available man was working 20 hours a day. And yet virtually the same thing happens year after year, although this was an extreme case. Perhaps some day Congress, and the Director of the Budget, will wake up and realize that prevention is the cheapest cure.

Forest Experiment Station
Missoula, Montana
September 17, 1926

During the past summer, the Kaniksu probably had the most trying ordeal any forest has endured. By the time the rains came, more than one-sixth of the Forest had gone up in smoke.

Forest Experiment Station
Priest River Idaho
June 1, 1927

I just learned that Frank Lacey died last winter of TB. I'd be willing to bet that his end was hastened by the very fatiguing work and his 40 days of smoke breathing on Watson Mountain and at other fires two summers ago.

Kaniksu National Forest
June 19, 1927

Had old Father Kaniksu, when he made the initial exploration of the Priest River Drainage, ever dreamed what the land which he discovered would some day resemble, no doubt he would have prohibited the use of his name to designate that National Forest. . . .

There were some scenes of desolation that pretty nearly drive an imaginative person crazy. It was easy to dream of what they had been just one year before. Then deep, soggy moss, delicate flowers, giant living trees that seemed a permanent part of the world; now baked mineral soil, a few shriveled lichens and mushrooms, and a black tangle of tree trunks, some still erect, some broken off half way up, some leaning, some flat on the ground. A pessimist would conclude that one summer's fires destroyed more beauty than all the inhabitants of the earth could create in many years, while an optimist would go singing through that blackened, misshapened world rejoicing because the forest will look just as beautiful as before — in two or three centuries. Take your choice.

On Train, Priest River to Spokane
August 26, 1928

A severe lightning storm broke in full fury over the Kaniksu early on the 24th. After five weeks without rain, it was a cinch that things soon would be popping. By daylight, the lookouts were shooting in fire reports at double time. There were 16 in this ranger district, which includes the experimental forest.

By 6 o'clock, all the smoke chasers and trail crew men had gone and soon another fire was spotted. Jim Ward asked me to attend to it. I picked up a couple of ribes pullers at the Blister Rust Camp and drove with them to Blue Lake from where the smoke we were seeking was plainly visible. We climbed 1000 feet above the Lake to reach our goal, which consisted of a patch of fire about 70 feet long and 10 feet wide. The fire, retarded by high humidity and duff moisture of early morning, was creeping through the duff and dry grass of an open stand of yellow pine and Douglas fir. In three hours, it would have been racing furiously up the dry hill side, hastened by the wind which arose shortly before noon; but in three-quarters of an hour, we had it completely trenched and were dumping dirt on the hottest points to smother the fire.

Jim was elated because every one of the 16 fires was cornered before reaching one acre in extent. This was a fine record of good organization. However, a few more fires, or a single blunder, would have made it impossible to capture every fire in the first morning stage. By late afternoon an uncombatable blaze might easily have covered several hundred acres, destroying eventually fifty to one hundred thousand dollars worth of timber and requiring days of effort on the part of several hundred men to suppress.

It makes one shudder to think that the Forest Service must engage in this kind of gamble year after year because of the parsimoniousness of Congress.

THE EVENING SKY IN JUNE AND JULY

(Continued from page 325)

ton, but beginning to be visible generally in all but the eastern and northeastern states, where the moon is setting as the eclipse begins. On the Pacific Coast the moon will set during the total phase of the eclipse or shortly after it has ended. All phases of the eclipse will be visible in the Pacific Ocean, except in the eastern part, and in Australia and Antarctica. In South America the beginning of the eclipse will be visible, except in the eastern part.

The partial solar eclipse of July 10-11 will be visible only in western Canada and the extreme northwestern part of the United States, in Baffin Land, all of Greenland, except the southern part, and the Atlantic Ocean north of Iceland and west of Scandinavia, to and beyond the north pole. This is a small eclipse, the part of the sun covered by the moon at maximum eclipse not exceeding two-tenths of the sun's diameter. The eclipse occurs late in the afternoon on July 10 in the northwestern part of the United States and western Canada; and is an eclipse of the midnight sun in certain parts of the eclipse area within the Arctic Circle.

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STRANGER IN THE SANCTUARY

(Continued from page 298)

again. But one day, after getting off to eat and drink, she had the urge to sit on her high wire and sing. The watchful vandals got all the eggs and tore up the nest, too. The persistent little thing then flew into a pine tree below the sanctuary and tried again, high up in the branches. I watched her carry the materials from here, even to the scented bit from the Breath-of-Heaven. I suppose the eggs are still there, if the jays did not find them. They could not have hatched.

Every day during the second nest building I phoned various pet shops until I had exhausted the list; no one had a male bulbul. Then, finally, one man told me of an importer who had just come from India with many Oriental birds, some bulbuls among them. My husband, who was not too much in favor of increasing the bulbul in this area, was patient about my venture in strange birds. He drove me to the importer's place, which was crowded with bright-winged creatures and loud with protests against cages. We found our bird among many others of his kind. He was like "Peter" in every respect except that the red in the eye area was more pronounced, in fact a long, whisker-like feather of red. The man assured us that this bird was a male and we took the poor, frightened thing away in a small box. I thought of happy, healthy "Peter" and how nice it would be to give freedom to this lately captured bird.

We kept the new bird in a cage for a few days and set him by the open window where he could see "Peter" going in and out of her nest. At this time she was constructing the penthouse on top of the first nest. The bird in the cage was wildly fearful when I approached with food and water, but when I left the room he would call in much the same way as our "Peter." Once I even heard him sing a low, lovely, prolonged song unlike Peter's, but seeming to contain the best parts of many bird songs, even a bit of the song of the black-headed grosbeak, which, at the time, filled our sky with music. "Peter" seemed to pay little attention to the new bird. She had her mind only on the new nest.

The day "Peter" added the scented twig to her nest I felt it was high time to release "Mister," as we had begun to call him. Maybe I did not handle the thing wisely. All my friends say I should have kept him longer in the cage. But he kept beating himself against his bars and losing feathers at an alarming rate. I felt, too, that this was the time "Peter" would welcome him. She was down at the bird bath when I released him. He flew to the first pine branch and started to "talk" about his strange freedom. "Peter" knew he was there instantly and made at him with her spread wings. I will never know whether she was too glad to see him or disliked him on sight, but the last I saw of the new bird was his tail as he took off out of the sanctuary and into the blue. It was not the fast-disappearing fifteen dollars that bothered me as much as my concern for the poor bird's safety. I have tried to tell myself that if Peter could survive on the land for dear-knows-how-long before she became our pampered darling, then perhaps "Mister" has a chance. We hope he found a place like this and people who are a little sentimental about birds.

My husband was sure that when I released the strange bird, "Peter" would take off with him and that would be the last I would see of either of them. But she had no such idea. We think the reason for her rejection might well have been that the other bird was a sub-species, not quite the same as this one, the way there are many kinds of sparrows in the same general family. "Peter" looks wonderful as we write, sleek and full of song and friendliness. I have no idea how old she is, but her nails are quite long and that is a sign of years in a bird. Friends who know about her say: "She's so tame you could cage her." But I say she has earned her freedom. Better to chance hawk and cat than the slow death of prisons. Besides, what are wings for?

THE GOULDS

(Continued from page 317)

donated them to the Academy of Natural Sciences in Philadelphia.

To the last, Gould continued actively to work, although suffering for years from a painful disease, probably cancer. During his remaining few years his friend, Dr. Sharpe, assisted him materially. Sharpe wrote the whole text of the "*Birds of New Guinea*." Dr. Sharpe also completed Gould's unfinished works after Gould died on February 3, 1881, at his home in London. John Gould was survived by several daughters and sons. One of them, Charles Gould, wrote the popular book, "*Mythical Monsters*."

Although Gould impressed his fellow ornithologists as being stern and somewhat brusque, he was straight-forward and exact. He was always regarded as a kindly man, but he impressed most people with his exceptional qualities as a naturalist, artist, and businessman, a unique combination, since many bird painters lack business ability. The English biographer, G. T. Bettany, paid a high tribute to Gould's character when he said: "Without any advantages of Education and Position, Gould achieved a great success by perseverance and love of his subject." Gould's old friend, Dr. Sharpe, has echoed Bettany's sentiments concerning this pioneer bird artist. "Considering that Gould was a self-taught man, his talents for sketching the details of a bird picture were remarkable; and though he had excellent interpreters in his wife, and afterwards in Mr. Lear, Mr. Richter, and Mr. Hart, still his was always the moving spirit in designing the plates." In short, Gould's spectacular success may be attributed to his abundant energy and sustained drive, in addition to being a hard taskmaster.

Although John James Audubon and John Gould worked contemporaneously, their illustrations represent two different styles. As Dr. Friedmann has pointed out, their paintings exhibit the labors of their backgrounds. Audubon was trained as an artist, applying the principles of pattern and design to birds, with a highly esthetic sense to guide him, while Gould concentrated objectively on the bird itself, seemingly oblivious of the technicalities of pure art. Gould demonstrated, nevertheless, an acute sense of symmetry and balance. An original pencil sketch drawn by Gould in Dr. Friedmann's office depicts two birds perched on tree branches, the portrait being somewhat reminiscent of the several thousand pictures in the Gould folios. The striking elements are the deft pencil strokes, accurate anatomical details, and a realistic pose, suggesting a Louis Agassiz Fuertes' sketch.

Audubon managed to depict action, but often sacrificed an accurate representation because of his artistic exuberance. He made the finished painting himself, while Gould did not. Apparently Gould and Audubon knew of one another's existence, but whether they had ever met formally is not known. Perhaps their modes of living kept these two unusual men apart. Audubon worked under innumerable handicaps, suffering most from the lack of financial resources. Gould made a fortune, easily brushing all hardships aside, at the same time working under conditions much superior to those experienced by Audubon. Despite the scope and parallel of the works by these two ornithologists, in no way can they be classified as rivals. In many ways there was an analogy between Gould and Audubon with regard to their attention to mammals, notwithstanding their intense interest in birds. Audubon published, in collaboration with Reverend Bachman, the well-known *Quadrupeds of North America*, while Gould's similar work was the *Mammals of Australia*. Here again the natural stance of Audubon's mammals leaves much to be desired, while the character of Australian mammals are well-executed.

When Gould died, the *London Times* alluded to him as a true "Priest of Nature." Everyone knew, of course, that he was aided by a devoted Priestess. Blanchard Jerrold, a friend of the Goulds, wrote in 1881: "The loving, skilful hands of Mrs. Gould were at work, painting the birds which she and her husband so passionately studied together, through trials and perils innumerable, for many a long year . . . Mr. Gould never failed to tell his friends how deep was his debt of gratitude to the artistic aptitude and courageous devotion of his wife and fellow-traveller. She it was who gave form and colour to his 600 varieties of birds . . ." No one expressed sur-

prise when Gould requested that his epitaph might read: "John Gould: The Bird Man." He well deserved his title.

To date, no one has duplicated the work of these Olympian bird painters. Aside from developing a whole new technique of ornithological illustration, they must be credited with popularizing bird study by bringing its esthetic beauty before the public with such accuracy of form, color and natural beauty.

Now that these volumes are almost unobtainable — individual sets of the *Birds of Asia*, for example, recently sold for $2340 — we must resign ourselves to traveling a great distance and viewing these works at the Library of Congress or some other repository of antiquarian bird books. One thing is sure, the Goulds have so indirectly influenced our own bird artists — compare the work of the Goulds with that of Fuertes, Brooks, Weber, Peterson — that we can look forward to each new illustrated bird publication with keen anticipation.

Plant Hunter

Plant Hunter in Manipur. By Kingdon-Ward. New York. 1953. The British Book Centre. 254 pages. Illustrated. $3.25.

While this book is described by the author as merely a story of plant hunting, it is, actually, a story of adventure in the Manipur Hills of Assam. During World War II, Mr. Kingdon-Ward searched for downed aircraft in this "Hump" region, later to return to it as a horticultural detective. He knows the country well, and its people, and this is an extraordinarily interesting story.

New Biology

Biology and Human Progress. By Louis Eisman and Charles Tanzer. New York. 1953. Prentice-Hall, Inc. 455 pages. Illustrated.

The authors have divided this book into ten large units, each one built around one central idea. The first unit, for example, deals with the science of exploring life. A second unit considers biology in explanation of human behavior. The text is interesting and related to human experience. There are excellent suggestions for group discussion and for laboratory work. There is a brief but quite well rounded section dealing with conservation. All in all, this book is an excellent addition to the list of biology texts.

Fishing Birds

Natural Salt Water Fishing Baits. By Vlad Evanoff. New York. 1953. A. S. Barnes and Company. 96 pages. Illustrated. $1.75.

The title of this book for fishermen is quite descriptive of its contents, which seek to provide the angler with information on the most effective natural baits, and how and where to use them. It is, of course, also valuable to the user of artificial lures.

Downy

Downy Woodpecker. By Paul McCutcheon Sears. New York. 1953. Holiday House. 44 pages. Illustrated by Barbara Latham. $2.00.

This is a story in the life-cycle group being brought out by this publisher. It introduces the budding bird student to the downy woodpecker and how it lives.

Woodland Animals

Wonders of the Woodland Animals. By Jacquelyn Berrill. New York. 1953. Dodd, Mead and Company. 77 pages. Illustrated by the author. $2.50.

This is such an attractive little book, for an audience of "anyone from 8 up," that it is unfortunate that several small errors of fact should have been allowed to creep into the entertaining text. Some of these slips are due to loose statements, and others do not truly represent details of the life of certain of the mammals discussed.

Invertebrates

Fresh-Water Invertebrates of the United States. By Robert W. Pennak. New York. 1953. The Ronald Press Company. 765 pages. Illustrated. $14.00.

Recent years have seen a great increase in information about the invertebrates found in the fresh waters of this country, and Professor Pennak has organized material from more than five thousand sources in preparing this outstanding volume. It will, of course, serve as a notable reference work, as a text for college students, probably seniors and graduate students, and be invaluable to biologists and limnologists, entomologists and zoologists. Since much more remains to be learned about our invertebrate fauna, particularly of that of the western part of the country, this book is an essential as a background for such studies.

Western Trees

A Natural History of Western Trees. By Donald Culross Peattie. Boston. 1953. Houghton Mifflin Company. 749 pages. Illustrated by Paul Landacre. With end maps of western forests. $6.00.

Several of the chapters in this splendid book earlier appeared as brief articles in *Nature Magazine*, thus, we suspect, whetting the reader's appetite for more. This is, of course, not merely an identification text, although all the basic data for identification is included with the discussion of each tree species. It is really the story of the history, beauty and place in our economy of the trees of the western United States, Canada and Alaska. It is Donald Peattie's charming style that makes this book something special; makes it literature of trees. The author's love of trees and his intimate, first-hand knowledge of them is obvious in the delightful descriptions. It is a book for reading as well as knowing; a companion volume to his earlier *A Natural History of Trees.*

Madonna of the Rocks

Madonna of the Rocks. By Otto Frederic Kampmeier. Boston. 1953. Bruce Humphries. 355 pages. $3.75.

The author of this fine and long narrative poem is Professor of Anatomy at the University of Illinois, author of many scientific articles and a textbook of anatomy. However, when "sated with the daily prose," as he suggests in his "Prolegomenon," he finds animation in "the metric throes." And the reader will find great pleasure in this poem, laid in its first two parts against a background of Sicily, its third in Europe in general, and its last again in Sicily. There are provided some 58 pages of explanatory notes, which should, perhaps, be read first in their entirety to avoid interrupting the flow of the narrative by frequent excursions into the back of the book.

Cactuses and Others

Cacti and Succulents. By G. Gilbert Green. New York. 1953. Pitman Publishing Company. 238 pages. Illustrated in color and monochrome. $7.00.

Cactuses—if we may differ from the author in his title—and their related succulent plants have increased steadily in popularity, and continue to do so. Yet the literature for the enthusiast has not kept pace. Therefore this book should have wide acceptance as a most complete introduction to these interesting plants and to their care and culture.

Prairie Song

Prairie Song. By Lola Kerr Wilhelm. New York. 1952. Pageant Press. Illustrated by Barry Martin. $2.00.

This is an entertaining narrative poem for youngsters. It has a central character in the person of "Tumbly-Tee," a tumbleweed, and it is the story of the travels of the tumbleweed, which is quite a traveler, and what it encounters as it tumbles along. The poem was born of the author's desire to share with children of today her own childhood memories of the prairie country.

Forest Economics

Research in the Economics of Forestry. Edited by William A. Duerr and Henry J. Vaux. Washington 6, D.C. 1953. Charles Lathrop Pack Foundation. 475 pages. $6.00.

This is a collaboration of more than sixty authors who deal with 127 topics that constitute representative research problems in the field of forest economics. The book is the culmination of a three-year project carried on by the editors under a grant from the Charles Lathrop Pack Forestry Foundation. The specific objective of the grant was to compile and integrate a definition of the scope and method of forest economic research. This book should be of outstanding value to foresters and all concerned with the production and use of the forest resource.

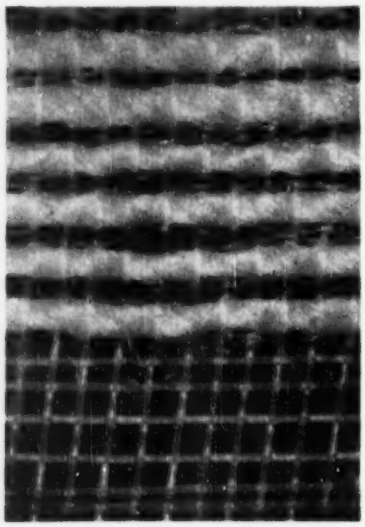
UNDER THE MICROSCOPE

By JULIAN D. CORRINGTON

TEXTILE SLEUTHING

THERE are three chief ways in which textile goods have been misrepresented in merchandising. First, the manufacture and sale of inferior materials purporting to be something better than they are, as in kempy or shoddy wool. The fabric may be all wool, right enough, but the quality is below acceptable standards. Second, the deliberate misstatement of quantity, as in false information concerning gauge and denier; that is, number of threads per inch and diameter of thread, respectively. Third, the substitution of one fiber for another; always, if misrepresentation is involved, as an inferior adulterant, as mixing cotton with wool. It is with this last class that the present article deals.

Fortunately we live in an era of ever-increasing honesty in advertising and merchandise labeling. The Pure Food and Drug Act was a tremendous stride in the right direction, followed by various restrictions on the misbranding of furs, textiles, and other products. Gone are the days of *caveat emptor* in many trades. In the "good old days" the textile buyer carried a pocket microscope known as a *linen tester*, to count the threads per inch, and it is still used for that and kindred purposes, but he also employed this optical sleuth to detect adulterants and shoddy goods. Today's labels commonly state that the fabric from which the garment is made is one-hundred percent wool, or that it is wool and rayon, or silk and orlon, and there is pride in establishing reliable brand names. Leafing through the costly colored advertisements in any woman's magazine will disclose many of these names. Competition in these displays is a good guarantee that products are made "as advertised."



Cotton and nylon sheer fabric, 150X.

Wool and nylon fibers from mixed fabric, 560X.

The older adulterated textiles, unlabeled as such, were mixtures of the more expensive wool or silk with the cheaper cotton. These seem to have disappeared from the market for, in our efforts to secure currently sold specimens for photographing, the only mixed goods encountered were those in which natural fibers were interwoven with synthetics. The designation of a fiber as artificial or synthetic should in no way impugn its quality. Some of these fibers are the equal of or superior to natural products for certain qualifications and always possess the advantage of uniformity. Mixed fabrics and yarns comprise an interesting set of studies for the microscopist, and an excellent school or club project.

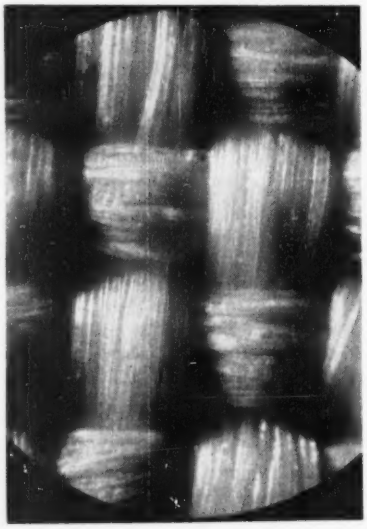
Begin by securing small amounts of fibers, threads, yarns, and fabrics of known composition, and set these up as standards, with which unknowns are to be compared. The beginner soon learns that wool fibers, like other hairs, have a covering of cuticular scales; that cotton fibers are flattened and twisted; that a synthetic fiber is homogeneous; and many other facts. If the microscopist is at all attracted by this subject, he should have his own authentic slide collection of named items.

Some description of the accompanying illustrations will serve to show the interest of this sort of microscopy. A certain soft suiting material was stated to be composed of a mixture of wool and nylon, yet microscopic examination of the closely woven fabric failed to reveal two different kinds of fibers. When a bit of the hem was frayed out with a needle, however, and several short pieces of the threads obtained, these were placed on a slide and teased with needles to reveal the individual fibers. Thus a field suitable for photographing was secured, and the picture shows two fibers in focus and side by side—the wool fiber has overlapping cuticular scales, the nylon fiber is perfectly round and smooth.

In another specimen, nylon and cotton threads are interwoven to make a sheer fabric. The photomicrograph shows the uniform grill work of the small synthetic fibers, crossed with the heavy, twisted cotton threads. Numerous individual unraveled cotton fibers are visible, identifiable even at this low magnification.

The third picture shows how closely similar two different fibers may appear. The fabric is a weave of natural silk and orlon threads. The real silk runs parallel to the short dimension of the photograph; the orlon threads run the long way of the picture. Some differences are — the orlon fibers are perfectly smooth and more nearly transparent; the silk fibers are less smooth, less transparent, and are yellowish-white; the orlon is pure white, a quality showing in the photograph as a stronger high-light. However, it was necessary to use polarized light on this specimen to make absolutely sure of identification of the fibers in most of the fields examined.

Added interest is given to this work by each new synthetic textile fiber developed, comparing its microscopic appearance with its predecessors. First it was the rayons — cupra, viscose, and others; then nylon had everything its own way. Now comes orlon and others. What new fibers will arrive with tomorrow, and what will be the characteristics they will confer on woven fabrics?



Silk and orlon fabric, 150X.

NEW MICROTOME KNIFE

THE answer to the prayers of private microscopists as well as those who teach microtechnique or pursue research, with reference to the ever-present microtome knife problem, has been provided by Dr. Robert T. Hance, most prolific of all authors of modern procedures, reagents, and equipment, to save time or money or improve the microtechnical routine.

In an earlier day, the bugbear of the formal laboratory of histology or embryology was the periodic necessity of honing and stropping the expensive microtome knives. Each graduate student was, in his turn, inducted in this ritual and, every so often, would take an entire day off to sit uncomfortably at a desk, in long, stiff, white coat, and very patiently use first a white Arkansas and then a yellow Belgian hone, with a special soap. Back and forth, back and forth, for endless hours, slowly, laboriously, went the knife, with periodic examinations under a microscope to see that all nicks were finally removed. Then the same performance had to be repeated on a specially mounted leather strop of special quality. There was an exact method of holding the knife-backing and of pushing or pulling the blade; you did it precisely so, or else. At last, if luck was with the exhausted operator, the nicks were all honed away, the feather-edge was stropped off, and the knife would cut a single human hair one inch away from the grasp. The costly equipment was then carefully cleaned and put away till the next day of atonement arrived.

For much ordinary sectioning this chore was eliminated by the advent of safety-razor blades in a special holder, but these were unsuitable for fine work. The new Hance outfit can replace both the professional microtome knife and the safety-razor blades. It cuts the initial cost of a fine microtome blade by eighty percent and the maintenance to nearly zero. The knife is made of a tough steel that will take and hold a keen edge. The knife holder, shown at the top of the illustration, is of tempered Masonite, and will fit any standard microtome. The position of the blade in the holder is adjustable, as also that of holder in microtome. At the lower right of the picture, the knife is shown mounted in the honing guide, where the blade is held at exactly the right angle, and moved with ease over a succession of three grades of emery paper. The procedure is similar to rubbing a block of wood on sandpaper, and scarcely more exacting.

An edge can be produced that will show few or no surface scratches on the bevel and no irregularities of the edge, when viewed under magnification. Below, in the illustration, is an adjustment key, and to the left the several grades of paper, designated as A, B, and C.

This outfit has another advantage; maximum safety for the operator. So little of the blade protrudes that deep cuts cannot occur, in the event of an accident. When not in use, the blade is reversed to the safety position, where there can be no damage to fingers, blade, or property. At Ward's, who are marketing this assembly, they have been using it for some time in the preparation of their regular catalog items of prepared microscope slides; probably the finest testimonial conceivable.

In our own work we have found that the Hance knife fulfills all claims and does an excellent job. We can recommend it to our readers without reservation.

Order from Ward's Natural Science Establishment, Inc., P. O. Box 24, Beechwood Station, Rochester 9, N. Y. Order numbers: C 864, complete Hance Adjustable Micro-Knife Kit, as illustrated, $4.95. C 864a, honing papers (renewals), set of 3 grades, $0.75.

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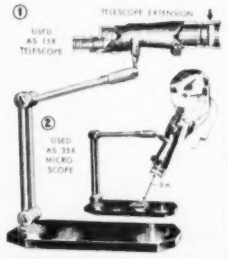

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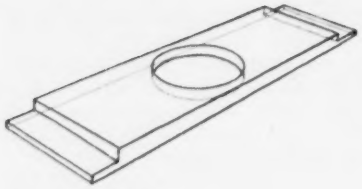

DEEP-WELL SLIDES

ILLUSTRATED herewith is a new hanging-drop or deep-well slide made of a clear plastic. The size is that of the usual microslide, 3 x 1, with a thickness of 3/16". The ends are cut down so that these slides can be stored in standard slide boxes. The central cavity is 3/4" in diameter and slightly over 1/8" deep. These slides are unbreakable, and cost approximately 40 percent less than corresponding glass slides.

This item serves admirably as a microaquarium and for observation of organisms in a drop suspended from the under side of a cover glass. It is likewise one of the best slides for the permanent mounting, in glycerin, glycerin-jelly, or balsam, of relatively large or thick objects, as a series of frog eggs and embryos. Ward's has for some time prepared their larger chick embryos, as those of 48 and 72 hours, by plastic embedding of the whole embryo, then cutting the material into a disc that will fit the deep-well slide. No cover or mountant is thus necessary and the preparation is unbreakable, either by dropping or by running an objective onto the slide.

Order from Ward's Natural Science Establishment, Inc., P. O. Box 24, Beechwood Station, Rochester 9, N. Y. Specify number C 921, Hanging Drop Slide; each, $0.45; dozen, $4.50.

SPECIAL OPTICS FOR VATICAN OBSERVATORY

ONE of the most difficult jobs in the history of optical manufacture has been completed by the Bausch & Lomb Optical Company for the Vatican Observatory. The task involved production of four identical six-inch prisms, special lenses and first-surface mirrors for a spectrograph for the Vatican's Astro-Physics Laboratory that will determine the composition of stars of various magnitudes.

Made from a flint-type glass, specially selected and highly annealed, the 61-degree prisms are accurate in performance to five-millionths of an inch and required nearly two years to produce. Interferometer tests, the most precise known, were used to determine the extent of each polishing operation. Fine polishing, which is done by hand, was limited to 10 minutes so that the heat generated by polishing did not damage the prisms. After each operation the prisms were allowed to cool for one hour.

The spectrograph will be used with a telescope to record light emanations of stars on sensitized photographic plates. Through its prisms, it will split light into its component colors or wavelengths, and by reference to these, the physical and chemical make-up of stars will be determined.

OPTICAL TRICKS
2. The Perceptible Penny

IT IS very easy these days to make money disappear without recourse to magic, but to do the opposite and cause a coin to appear out of nowhere — ah, that is indeed a feat! The only hitch to this illusion of the discernible dime, or other denomination of manifest mazuma, is that you must have a coin to begin with, alas.

Stand, as shown in the illustration, with a tumbler or beaker on a table before you and a glass or pitcher of water in hand. A cent or other small coin is placed in the tumbler, at one edge of the bottom, and the position of your head should be such that the coin lies just beyond the line of sight in looking over the edge of the glass. Holding this position, fill the tumbler with water without disturbing the coin, whereupon it will come into full view.

Explanation? Light rays reflected from the penny upward are bent or refracted away from the vertical upon emerging from water into air, as shown in the drawing. All objects immersed in water and viewed from a position above the water surface appear to be higher than they actually are, our brain assuming that all light rays proceed only in straight lines at a uniform velocity. But we are fooled by the fact that light travels slower in a denser medium (water) than in a less dense (air), and bend when passing from a medium of one density into one of a different density. Both savages and sportsmen have learned that they must aim below a fish's apparent position if they would hit it with spear or bullet. The dotted line shows the apparent position of the coin when the vessel is full of water. What we think we see is a virtual image of the object, nearer and higher than the actual location.

'SCOPAK

CAROLINA Biological Supply Company has come up with an outfit that should be welcomed by both the teacher and the amateur — a unit package of slides and cover slips. This is an item that everyone has wondered for ever so many years why no one has done it before (well, — why *didn't* they?) and consists of ½ gross slides and ¼ oz. each of Nos. 1 (approx. 40) and 2 (approx. 30) square cover glasses, 22 mm (7/8").

Now the instructor can pass out one package per student for a semester's work or unit thereof; now the private worker can buy both slides and covers together economically, a few at a time. Order from Carolina Biological Supply Co., Elon College, N. C., and specify A 637 'Scopak; $2.60, less in quantity lots.

SONGS FOR ZOOLOGY

HOW OR WHY?

Where or When?

Richard Rogers

It seems I've seen this *Turtox* sheet before
Somebody had one up at Sigma Chi,
But I can't remember how or why.
The junk to be labeled seems a great deal more,
Or else my memory's a trifle shy,
But I can't remember how or why.
Some things I'm seeing for the first time,
And this shouldn't happen to a guy!
And so I'll flunk this truck again,
No luck again,
I'm stuck again,
But Lord knows how or why!

APPLE POLISHER

DOES a mirror reverse directions in producing an image? Everyone is familiar with the backward print seen in holding a book to a mirror. But is this a fair test? If book and mirror are both in front of the observer, then the print is reversed in the first place; imagine a transparent page and that you are looking through it to see the letters on the side next to the mirror. Are they not in the same sequence as in the reflection? Still better, make a short word, as "dog," out of wire and hold this gadget in front of you, facing a mirror. Question: does the mirror reverse the object?

Roger Tory Peterson's

FIELD GUIDE SERIES

Roger Tory Peterson, originator and editor of the famous Field Guides, has probably taught more people about birds than any other man now living. His classic *A Field Guide to the Birds* has become indispensable to both beginners and experts and is used in every university that teaches ornithology. Other guides under his editorship follow the same system.

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